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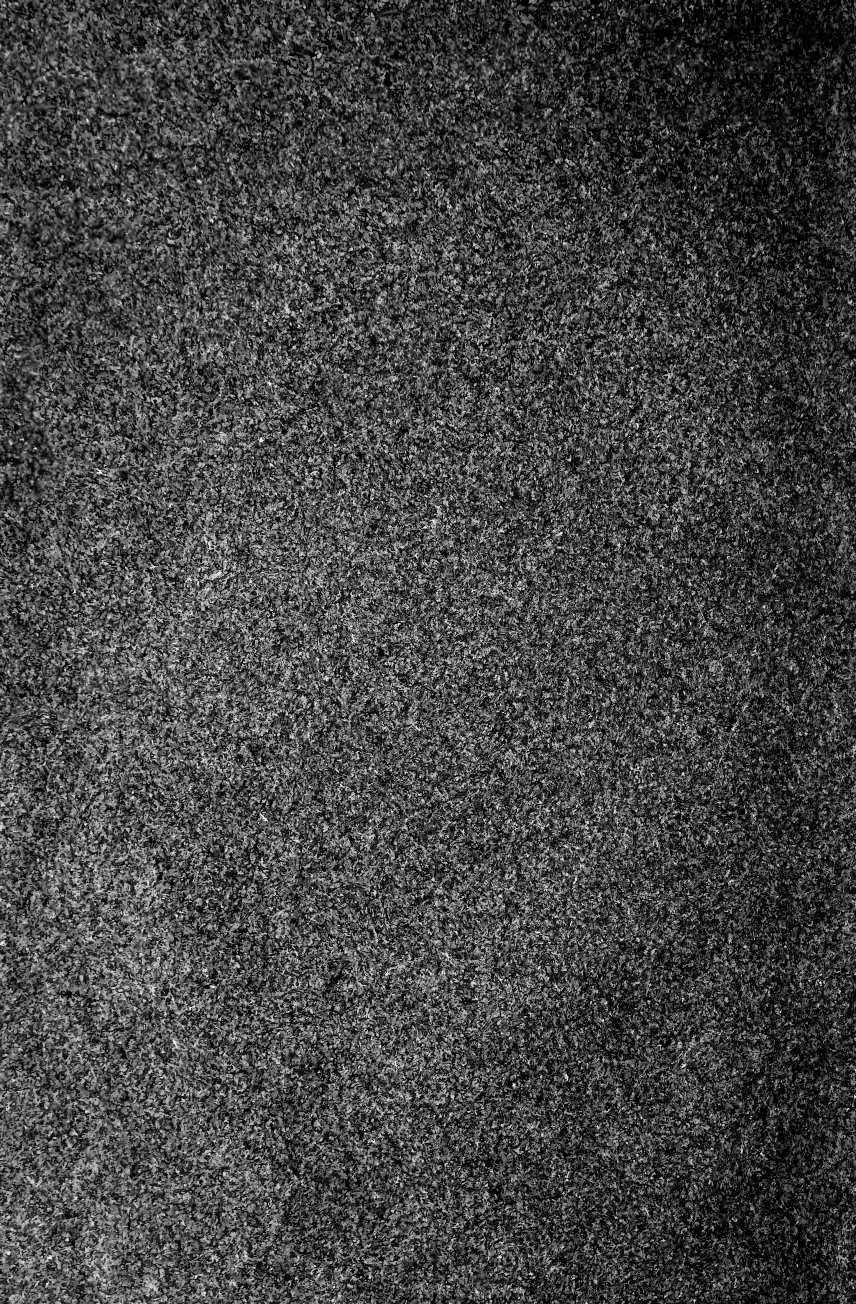
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GUIDE  
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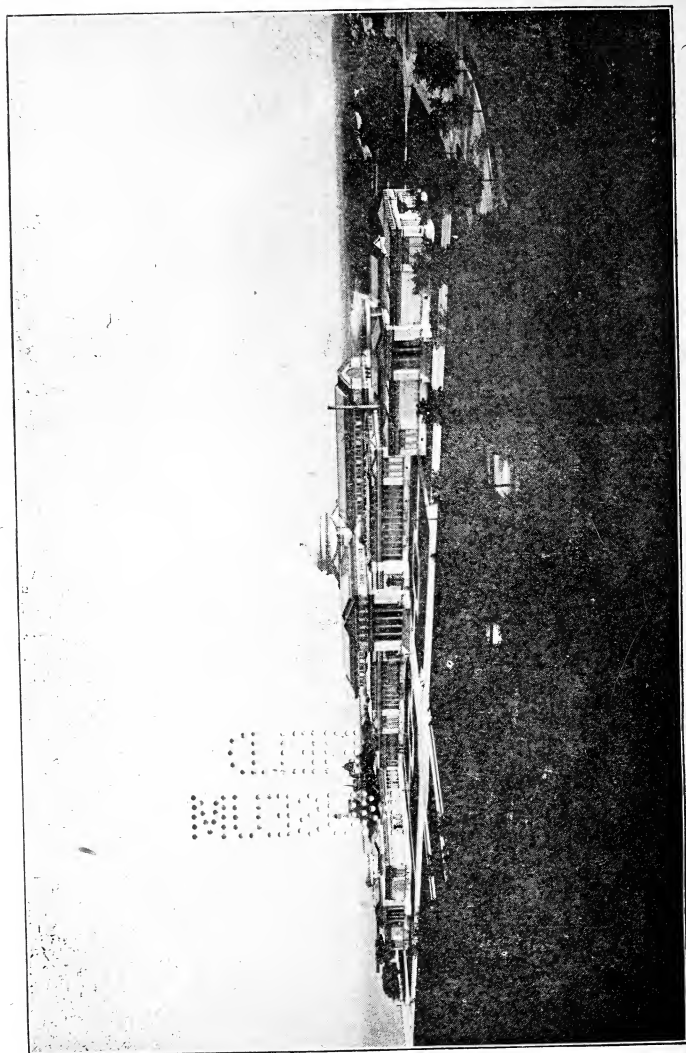
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## INTRODUCTION.

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The Guide locates, by means of plans and numbers, the principal objects of interest in the Halls, Courts, Alcoves and Galleries. The Columbian Rotunda is described first. The Departments are then taken up separately in the order of their usual sequence—Geology, Botany, Zoology, Ornithology, Anthropology and the Transportation collections.

If a general view of the entire Museum is desired, it is suggested that the Departments be visited in the order above indicated. After viewing the Columbian Rotunda (see page 13) the visitor may proceed through the Reading Room and Lecture Hall to the West Pavilion, where are installed the collections of Geology, (see page 17). The Halls should be visited in the following order: 35, 36, 59, 60 and 61—Paleontology; 62, 63 and 64—Meteorites and Mineralogy; 65—Dynamic Geology; 66—Lithology; 67 to 80 inclusive, except 76 and 77—Economic Geology and Metallurgy; 76 and 77—Geographic Geology.

Returning to the West Court through Hall 35 the Botanical Department may be reached by the stairway in Alcove 102. The circuit of the galleries should be made from the West to the North, then to the East, and finally to the South Gallery. The Botanical collections are arranged on a geographical basis, and begin on the South Gallery with specimens from Asia, Europe, Africa, and follow with the South and North American Series.

After descending to the main floor the visitor may proceed to the south side of the West Court and should visit the Halls of the Zoological and Ornithological Departments.

The Department of Anthropology can be entered from the South Court, and may be studied in Halls 10, 11 and 18, devoted to the Ethnology of the Plains Tribes; Halls 16 and 17, Ethnology of the Southwest, or Pueblo region; Halls 14 and 15, South American collections; and 12 and 13, the North Pacific Coast. The East Court contains exhibits relating to the Archaeology of America. Halls 2 to 6, 8 and 9, as well as the North Court are all devoted to collections illustrating the Anthropology of Europe, Asia and Africa. Hall 3 is devoted to North American Ethnology.

The Transportation collections are located in Halls 37 to 58, inclusive.

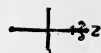
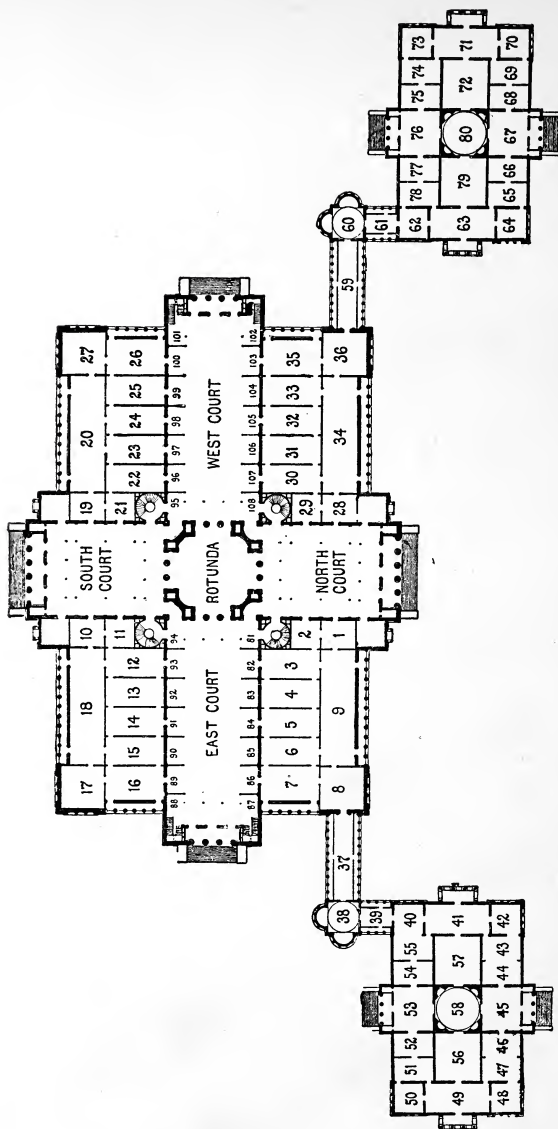
Returning now to the center of the main building, the visitor may examine American aboriginal games in Hall O. Halls 30 and 31 contain the Ethnology of South America; Hall 32, Gems and Jewels; and Hall 33 Ceramics.



## INDEX TO SUBJECTS.

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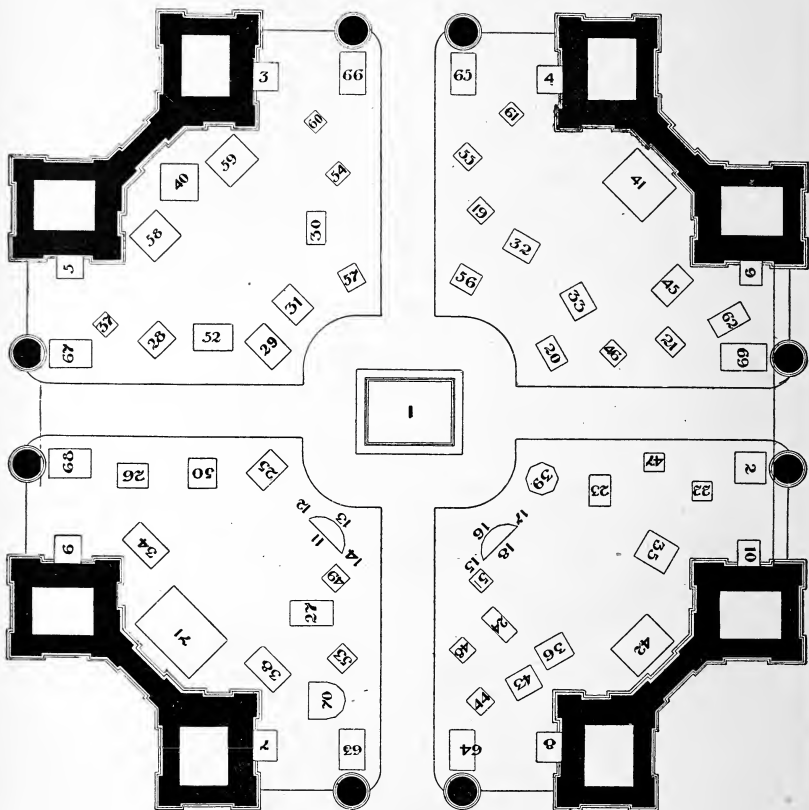
PLAN OF BUILDING

## INDEX TO PLAN.

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Halls 35 and 36	}	Geology.
Halls 59 to 80		
East Court	}	Anthropology.
North Court		
Halls 1 to 18		
Halls 30 and 31		
West Court	}	Zoology.
South Court		
Halls 19 to 25		
Halls 26 and 27		Ornithology.
Galleries	}	Botany.
		Physical Anthropology.
Halls 37 to 58		Transportation.
Hall 32	}	Gems and Jewels.
		"H. N. Higinbotham Hall."
Hall 33		Ceramics.





PLAN OF ROTUNDA.

## THE EXPOSITION MEMORIAL.

### COLUMBIAN ROTUNDA.

The Rotunda of the main building of the Museum is devoted to an artistic memorial of Columbus and of the Columbian Exposition. The center-piece—the statue of the Great Discoverer with uplifted sword consecrating the New World—at once attracts attention both as an historical study and as a masterpiece of art. The original sketch models of the figures and groups of figures ornamenting the main Exposition buildings, and donated by the Exposition to the Museum, occupy the entire space around the statue. These models are invaluable as works of modern art, representing the genius of the most talented sculptors of the present day.

In the contracts entered into with the various prominent sculptors they were called upon to furnish what are called “Sketches” of the sculptural decorations, i. e., the models were to be about one-sixth of the full size; from these models the Exposition’s force of sculptors prepared full-size work by enlarging the “Sketches” six times. All the models were first submitted to the architects of the buildings for their approval, in order to harmonize the sculptural decorations with the architecture. The models here shown are the original “Sketches.”

NO. 1.—Columbus. By Augustus St. Gaudens. This imposing full size statue stood overlooking the Court of Honor at the main portal of the Administration Building. Translation of Latin inscription on Pedestal:

“In late years the centuries will come

“When the ocean will loose its fetters

“And the vast earth will lie open,

“And Tethis will disclose new countries.

“When Thule will no longer be the remotest of lands.”

NO. 2.—Statue of the Republic. By Daniel C. French.

NOS. 3 TO 38.—Statuary on Administration Building. By Karl Bitter, Sculptor.

- |                        |                |
|------------------------|----------------|
| 3. Water Controlled.   | 21. Education. |
| 4. Water Uncontrolled. | 22. Truth.     |
| 5. Fire Controlled.    | 23. Strength.  |
| 6. Fire Uncontrolled.  | 24. Liberty.   |
| 7. Earth Controlled.   | 25. Charity.   |
| 8. Earth Uncontrolled  | 26. Abundance. |
| 9. Air Controlled.     | 27. Theology.  |
| 10. Air Uncontrolled.  | 28. Diligence. |
| 11. Goddess of Fire.   | 29. Joy.       |
| 12. Fisher Maiden.     | 30. Unity.     |
| 13. Bather.            | 31. Strength.  |
| 14. Diana.             | 32. Peace.     |
| 15. Air.               | 33. Religion.  |
| 16. Harvest Girl.      | 34. Industry.  |
| 17. Blacksmith.        | 35. Art.       |
| 18. Flower Girl.       | 36. Commerce.  |
| 19. Patriotism.        | 37. War.       |
| 20. Tradition.         | 38. Justice.   |

NOS. 39 TO 45.—Sculpture Work on Agricultural Building. By Philip Martiny.

- |                   |                  |
|-------------------|------------------|
| 39. Four Nations. | 42. Horse Group. |
| 40. Four Seasons. | 43. Ceres.       |
| 41. Cattle Group. | 44. Zodaic.      |

45. Victory.

NOS. 46 TO 51.—Figures of Inventors. Sculpture Work on Machinery Hall. By Robert Kraus.

- |               |                 |
|---------------|-----------------|
| 46. Galvane.  | 49. Ericsson.   |
| 47. Whitney.  | 50. James Watt. |
| 48. Daguerre. | 51. Senfelder.  |

NOS. 52 TO 57.—Six figures on Machinery Hall. By M. A. Waagen.

- |              |              |
|--------------|--------------|
| 52. Science. | 55. Fire.    |
| 53. Earth.   | 56. Air.     |
| 54. Water.   | 57. Victory. |

NOS. 58 AND 59.—Sculpture on Colonnade. By M. A. Waagen.

- |                  |                   |
|------------------|-------------------|
| 58. Horse Group. | 59. Cattle Group. |
|------------------|-------------------|

NOS. 60 AND 61.—Electricity Building.

60. Electrification, by I. A. Blankinship.

61. Experimental Electricity, by N. A. McNeil.

NO. 62.—Sculpture Work on Lagoons.

62. Lion at Base of Obelisk, by M. A. Waagen.

NOS. 63 TO 66.—Sculpture Work on Boat Landings, by

D. C. French and E. C. Potter.

63. Industry (Horse).

65. Wheat (Bull).

64. Sloth (Horse).

66. Indian Corn (Bull).

NO. 67 TO 69.—Sculpture Work on Bridges of Lagoons.

By Edward Kemeys.

67. Buffalo—Male.

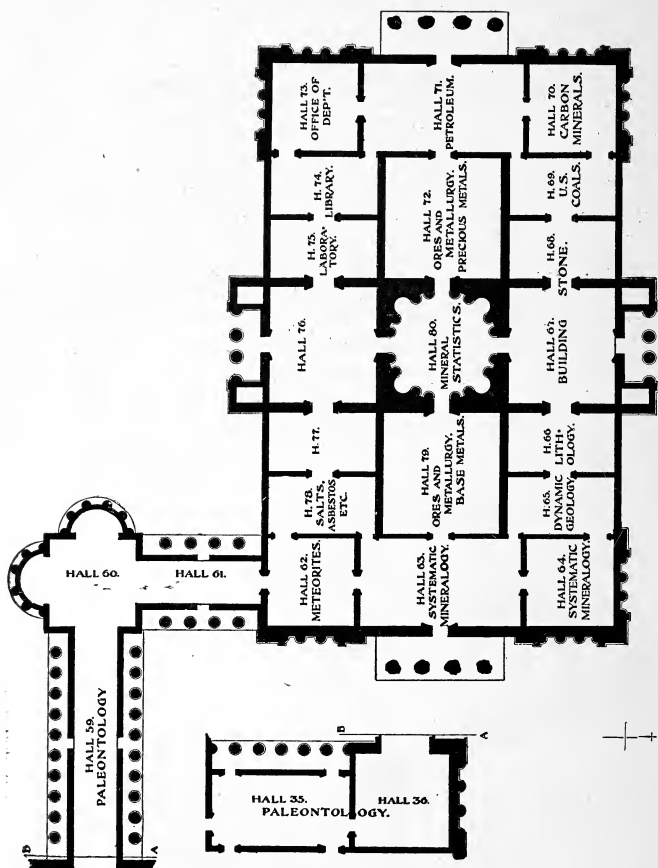
68. Buffalo—Female.

69. The Still Hunt.

NO. 70.—Glorification of Discovery. By Cratt.

NO. 71.—The Columbus Quadriga. By French and Potter.

This crowned the arch of the Peristyle.



PLAN OF DEPARTMENT OF GEOLOGY.



## DEPARTMENT OF GEOLOGY.

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The collections gathered in the Department of Geology are designed to illustrate the history of the earth's development and the materials which form its crust.

Since, moreover, the science of geology has both a theoretical and a practical side, a division of the collections has been made in order to present these two phases of the subject. Those illustrating geology as a theoretical science are to be found in the Division of Systematic Geology; those showing it more particularly in its relations to human arts and industries, in the Division of Economic Geology.

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### DIVISION OF SYSTEMATIC GEOLOGY.

This division comprises six sections, located as follows:

Paleontology: Alcove 103, Halls 35, 36, 59, 60 and 61.

Meteorites: Hall 62.

Systematic Mineralogy: Halls 63 and 64.

Structural and Dynamical Geology: Hall 65.

Lithology: Hall 66.

Geographic Geology: Halls 76 and 77.

These sections may be considered as illustrating, first, the life of the globe from its earliest beginnings to its latest and highest forms; second, the bodies which come to us from regions outside the earth and which furnish the only material sources from which we can learn the composition and structure of the heavenly bodies; third, the component minerals of the earth's crust, classified according to their chemical composition; fourth, the aggregates of these into rocks; fifth, the effects produced by physical forces in forming and shaping the materials of the crust, and sixth the configuration and mode of formation of the surface of the earth.

**ALCOVE 103. HALLS 35, 36, 59, 60 AND 61.**

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**PALEONTOLOGY.**

In the Section of Paleontology it is sought to illustrate by fossils or by casts and models of these, the animal and vegetable forms which have characterized the life of the globe at the successive stages of its history. The arrangement is primarily chronological, and secondarily zoological.

Advancing from hall to hall the visitor sees the development of life upon the earth illustrated in the same order in which it occurred in Nature. Thus in the first hall of the series, Hall 35, are to be seen the fossils of the earliest era of the earth's history, the Paleozoic; in the next hall, Hall 36, and part of the next, Hall 59, those of the middle era or Mesozoic; and in the remaining three halls, the fossils of the Cenozoic or recent era. Within each hall, so far as is possible, the fossils of each period are arranged so that those of the earliest period shall come first, then those of the next succeeding age and so on.

Within each period, however, the specimens are arranged in accordance with their zoological rank, beginning with the lowest. Fossil plants, where they occur, are thus placed first; then in order, Protozoans, Radiates, Mollusks, Articulates and Vertebrates.

The specimen labels show: 1st, the name of the species, together with that of the authority by whom named; 2nd, the geological period or epoch to which each belongs; and 3rd, the locality.

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**ALCOVE 103.**

Here are shown several large specimens of general geological interest. Among them are two broad slabs of rock cut from ledges the surfaces of which had been scoured and polished by movement of the continental glacier over them. One of the slabs is sandstone and comes from North Amherst, Ohio, the other is limestone and comes from Kelley's Island, Lake Erie. Several types of glacial marking are illustrated on the slabs, including fluting and iceberg action. The slabs are probably the finest of the kind to be seen in any museum.

Other specimens here shown are a section of *Arietites*, a mollusk allied to the modern nautilus, and tracks of reptiles of the Triassic period, on sandstone from Turner's Falls, Mass.

A model of the Moon is also exhibited here. This model in relief of the visible hemisphere of the Moon, is made on a horizontal scale of 1:600,000 and vertical scale of 1:200,000. The hemisphere is 18 feet in diameter. It is much the largest and most accurate work of the kind ever executed.

The division of the Moon's surface into plains and mountainous regions is well illustrated, also the great size and peculiar characters of the volcanoes.

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### HALL 35.

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This hall contains two somewhat distinct series, one introductory to the study of fossils in general, the other, fossils of the Paleozoic era.

Entering the hall from the West Court, the three wall cases on the right are those devoted to the introductory series. The first two of these are devoted to a comparison of ancient and modern forms. Beginning with the lower orders of life, there are shown sponges living at different periods of the earth's history, and a modern sponge for comparison; while in succession corals, crinoids, brachiopods, articulates and vertebrates are similarly illustrated.

In the third case of the series methods of fossilization are illustrated. The methods shown include preservation of hard parts, as shells and bones, internal moulds, external moulds, impressions, incrustation, carbonization, silicification, phosphatisation, etc.

The wall cases to the left as the visitor enters from the West Court, and the floor cases, are devoted to fossils of the Paleozoic era. The order of these advances toward Hall 36, the floor cases being used for exhibiting the smaller fossils of each period illustrated by larger fossils in the adjoining wall case.

Beginning with the Cambrian, several specimens of the *Eozoon Canadense*, supposed by some to represent the earliest form of life, are shown.

The specimens are made up of alternate layers of calcite and serpentine, which are thought by some to represent the shell and body cavity of an ancient, huge Rhizopod. Others regard the masses as of wholly inorganic origin.

Other interesting Cambrian and Ordovician fossils shown are as follows:

*Oldhamia*—probably a plant of the order of marine algæ; *Brachiospongia*—a representative of the classes of sponges; *Monticulipora*—of corals.

*Diplograptus*, *Tetragraptus*—Hydroids known as graptolites, abundant fossils of this era. The name is derived from the Greek word meaning "to write," and refers to the plume-like nature of the remains. *Scolithus*—supposed to represent the borings and tracks of worms.

*Tentaculites*—Minute mollusks of the class of Pteropods. *Conularia*—perhaps also Pteropods.

*Paradoxides*, *Asaphus*, *Olenellus*, *Agnostus*—Trilobites, the most common and characteristic fossils of early Silurian times. They were crustaceans, allied to the horse-shoe or king crabs of the present day. Two models illustrate the various parts of their structure, and tracks of a trilobite, genus *Climatichnites*, are shown on a large slab of sandstone from Wisconsin. The number of important animal types having existence in even the earliest geological periods is worthy of note.

Trenton and Cincinnati epochs. *Receptaculites*, *Selenoides*—probably calcareous sponges. *Favistella*—Corals belonging to the family Favositidae or honey-comb corals, so called because made up of hexagonal, parallel columns. *Orthis*—a genus of the class of Brachiopods, characteristic of this epoch.

Brachiopods are sometimes called lamp shells, on account of their resemblance to a Roman lamp; the two valves of the shell are unequal in size, and the beak of the larger curls over on that of the smaller. Though found only in small numbers at the present day, they were in Silurian times the most abundant and characteristic form of marine life. In structure they have points of alliance with the Worms on the one hand and with Mollusks on the other. *Pleurotomaria*, *Murchisonia*—Gasteropod or univalve Mollusks common in the Trenton epoch.

Hudson River and Niagara epochs. Brachiopods are rep-

resented by large slabs containing *Leptoena*, also many species of *Lingulella*, *Lingula*, and *Rhynchonella*. Species of the latter genera exist at the present day. They afford a remarkable example of the power of a genus to survive the vicissitudes of time. *Glyptocrinus*, *Iocrinus*—Crinoids, the class of Echinoderms most abundant in early times. Attached by a jointed stem and bearing many-branching arms, they have been appropriately termed sea-lilies.

*Arthropycus*—supposed to represent the leathery stems of seaweeds. Some authorities, however, regard this fossil as representing the markings of worms.

*Eridophyllum*—corals of the Cyathophylloïdæ or cup-coral family. *Halysites*—corals of the Halysitidæ or chain-coral family. Nearly all Silurian corals belong to these two or the Favositid family.

*Streptorhynchus*—A representative Brachiopod. *Orthoceras*—Many specimens illustrating the size and distribution of this Silurian Cephalopod. The several sections show that the shell was divided by cross partitions into chambers. The animal occupied only the end chamber, but a long tube or siphuncle connected the others to its body.

Niagara and Lower Helderberg epochs.—*Favosites*, *Halysites*—Corals. *Eucalyptocrinus*—Crinoids. *Illoenus*—Trilobites. *Bythotrephes*—probably marine Algæ. *Pentamerus*—a large and abundant Brachiopod characteristic of the Niagara bed<sup>s</sup> of the Mississippi Basin. *Spirifer*, *Rhynchonella*—other common Brachiopods. *Eurypterus*—Crustaceans closely allied in structure to modern Scorpions, but being water breathers are classed with the Crustacea. A large number of specimens from the Waterlime group of New York.

Foreign Silurian fossils. From the Wenlock limestone of England, several specimens of *Periechocrinus*, *Cyathophyllum* and others. From the Bohemian beds, several species of Graptolites, the genera *Phacops* and *Dalmanites* among Trilobites, and many specimens of the *Orthoceras* family.

Fossils of the Devonian Age or age of fishes. The fishes which by their size and abundance characterized this age, belonged to two orders—Ganoids, represented at the present day by the garfish and sturgeon, and Placoids, the order which includes sharks, skates and rays. They differed in many respects



from the fishes of the present day, however. The Ganoids were covered with thin, bony scales, had teeth of reptilian character and jointed, paired fins. The Placoids had cartilaginous skeletons, no scales, no gill covers, and many of their characters were embryonic.

Lower Devonian fossils of the Corniferous period. *Favosites*—Honey-comb corals. *Heliophyllum*—Cup corals.

*Ophiura*, *Loriolaster*—Asteroids similar to modern starfishes. Being free-moving Echinoderms, they mark the introduction of a higher type than the attached Crinoids. *Macropetalichthys*—a Ganoid fish.

Lower Devonian fossils. *Syringopora*—Chain corals. *Zaphrentis*—common and characteristic cup corals. *Orthis*, *Atrypa*, *Spirifer*—Brachiopods. *Coccosteus*—a typical Ganoid from the Old Red Sandstone of Scotland.

Middle Devonian fossils. *Psilophyton*, *Sphenopteris*, etc.—early land plants from the Devonian beds of St. John, N. B. They were of low orders, chiefly mosses and ferns. *Holoptychius*, *Glyptolepis*, *Diplopterus*—fishes from the Old Red Sandstone of Scotland. These are nearly all Ganoids, as may be seen from the large, bony scales with which they are covered. *Cyathophyllum*, *Cystiphyllum*, *Zaphrentis*—Cup corals.

Upper Devonian fossils. Large, polished masses of *Acerularia* from Iowa, a honey-comb coral. *Dictyophyton*—belongs to the class of sponges. *Aspidosoma*, *Furcaster*—Asteroids. *Spirifer*, *Orthis*—Brachiopods. *Goniatites*—represents the Cephalopods. It is of the same type as *Orthoceras*, but coiled and the junction of the septa and shell (suture) is zigzag instead of straight. *Bothriolepis*—Ganoid fish. Note the thick, bony plates or armor.

Fossils of the Carboniferous Age, or age of coal plants. Naturally, land plants are the striking features of this age. They belonged to five great families, Conifers, Ferns, Lepidodendrids, Sigillarids, and Calamites.

*Cordaites*. This tree is allied to the Conifers, and had, probably, a straight trunk 60 or 70 feet in height. *Trigonocarpum*, in the same case, is supposed to represent its fruit. Ferns are represented by *Pecopteris*, *Neuropteris* and others, many imprints of sections of the fronds being shown. These frequently form the

center of clay concretions, as may be seen in some which have been broken open. Sections of trunks of *Lepidodendrids* and *Sigillarids*. One of the latter shows by its size that the trunk of the original tree must have been many feet in diameter, and perhaps 80 to 100 feet high. *Stigmaria*, probably represent the under-water stems of the *Sigillarids*.

The animal life of this period is characterized by the abundance of Crinoids. These reached their highest development at this time. Many specimens are shown, including *Platycrinus*, *Scaphocrinus* and *Pentremities*, the latter a Blastid or bud crinoid. Corals were also abundant, as represented by the columnar *Lithostrotion*, a true polyp coral, and *Dibunophyllum*, a cup coral. The cork-screw-like Bryozoan *Archimedes* is illustrated by several specimens. *Spirifer* and *Productus* are the leading genera among the Brachiopods. The Gasteropods, univalve mollusks, are represented by *Bellerophon* and *Pleurotomaria*. *Melonites* was an Echinoid allied to the sea-urchin of the present day; it differs from the latter, however, in having large plates and small spines.

Permian, or closing period of the Carboniferous. Fishes are represented by the *Paleoniscus*. Reptiles by the *Archegosaurus*, an animal which combined the characters of reptile and fish, having both lungs and gills, and being covered with scales. Plants are represented by leaves of the *Walchia*, a Lycopod.

A single floor case at the right contains a portion of a trunk of a tree of the Carboniferous Age. This tree was about two feet in diameter and the portion shown is six feet in height. On the wall an oil painting represents a forest of the Carboniferous Age, with ferns, clubmosses, equisetæ, etc., grown to the height of forest trees of the present day.

On the south wall is a series of twelve ideal landscapes of the different geological ages.

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#### HALL 36.

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Fossils of Mesozoic time, the age of reptiles. This age is characterized by the number and size of its reptiles, especially Amphibians. Here, too, are introduced the first mammals, birds and fishes of the modern type, and among plants the angiosperms.

WALL AND FLOOR CASES, LEFT, AND FLOOR CASE, RIGHT.—Triassic fossils. Many types of the Carboniferous Age continue to be prominent. *Equisetum*, belonging to the family of Equisetæ, or "Horsetails" of the present day, and *Pterophyllum*, of the order of Cycads, were most prominent among the land plants, and are illustrated by many specimens. Among the Lamellibranchs, the modern genus of *Modiola* is introduced. *Ceratites* represents the Orthoceras of early times from which it will be seen to differ in being coiled, and in having a more complex suture.

Jurassic Fossils.—Among plants, Cycads are illustrated by several specimens of *Cycadoidea*. Among invertebrates the beautiful Crinoid *Pentacrinus* is especially noteworthy. Other Echinoderms are *Cidaris*, *Hemicidaris*, *Pygaster* and *Clypeaster*, the two latter being allied to *Clypeus* or "sand dollar" of the present day.

Brachiopods, mostly of the sloping shoulder type, are illustrated by the genera *Terebratula* and *Rhynchonella*. Among bivalve mollusks the introduction of the modern genus of *Ostrea* or oyster, is notable.

The remainder of the hall is devoted to specimens illustrating Dinosaurs, the largest land reptiles the world has ever known. Most of the specimens shown were collected by special expeditions sent by the Museum for the purpose to Wyoming and Colorado. The specimens include nearly complete fore and hind limbs, series of vertebrae, shoulder blades, ribs and numerous limb bones of Dinosaurs. The genera represented are *Brontosaurus*, *Morosaurus*, *Claosaurus* and others. Perhaps the most important specimen is a continuous series of vertebrae from the neck downward of an individual Brontosaurus. Ribs, pelvis and one femur of the same individual are also shown. The vertebrae alone aggregate thirty feet in length, and single ones have a height of three feet. A femur and humerus of another individual Dinosaur are shown, which are the largest bones of this kind yet known. Each is six feet eight inches in length, and the femur has a weight of about 700 pounds. Mounted fore and hind limbs, the latter partially restored (west wall), also give an idea of the size and structure of the Dinosaurs.

FLOOR OF HALL.—Restoration of *Hadrosaurus* from the Upper Cretaceous of New Jersey. This was a huge land reptile,

or Dinosaur, 28 feet in length. It was probably a vegetable feeder, and able to stand and walk after the manner of birds.

**SOUTH AND EAST WALLS.**—Large slabs and casts showing tracks of reptiles made in the Triassic period in the Connecticut River Valley. Little is known about these animals, except so much as can be learned from their foot-prints. The *Brontozoum* was a three-toed animal, probably at least 14 feet in height, with a stride of over 3 feet. All were probably Dinosaurs, living at a somewhat earlier period than those of the Western States.

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### HALL 59.

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**FIRST CASE RIGHT.**—A large number of beautifully preserved remains from the lithographic slate beds of Solenhofen. They include some of the earlier Insects, Crustacea, resembling the modern lobster and king crab, and remains of large squids. In some of the latter the imprint of the whole animal is shown while others are represented only by the fossils known as Belemnites, which are simply the internal skeleton or a portion of it.

**FIRST AND SECOND CASE, LEFT.**—Ammonites, remarkable for size and complexity of suture. Many specimens are shown, including the genera *Cardioceras*, *Arietites*, *Grammoceras*, etc. Some of the *Arietites* are 3 feet in diameter. The sutures of some specimens have been painted to bring out the markings. Many specimens of *Nautilus* and allied Cephalopods. Ammonites were especially abundant in this age.

**SECOND AND THIRD CASES, RIGHT.**—Remains and restorations of *Ichthyosaur*, *Pliosaur*, *Plesiosaur*, and other marine reptiles of the age. The two former often reached a length of 40 feet. They had stout bodies, short necks, enormous eyes, long teeth and fin-like tails and paddles. The latter were their organs of locomotion. The huge eyes and teeth indicate that they were predatory and voracious animals, their food being probably fishes and other reptiles. The *Plesiosaur* was a more graceful animal, with long neck, small head and powerful paddles, but in habits similar to the preceding. All had many fish-like characters.

The specimens are chiefly from beds in England and Germany, and include many species. The series is one of the finest to be seen in any museum.

The Pterosaurs, or flying reptiles, are illustrated by imprints of wings of the *Rhamphorhynchus*, an animal not unlike the bat in appearance, and by casts showing remains of *Pterodactyls*.

THIRD CASE, LEFT.—Jurassic fishes. Chiefly from the Solenhofen beds.

FOURTH CASE, LEFT.—Fossils of the Cretaceous period. Here we find the first of modern plants, or *Angiosperms*. Imprints of leaves are shown, many being modern genera, such as *Sassafras*, *Populites*, or poplar, *Betulites*, or birch, and *Viburnum*.

The localities illustrated are chiefly Kansas and Colorado.

Casts, much enlarged from the original, illustrate the forms of *Foraminifera*, whose shells make up the vast deposits of chalk which characterize this period.

Echinoids.—*Ananchytes*, *Holaster*, *Toxaster*, etc. These are free-moving forms in contrast to the stemmed so abundant in earlier times.

FOURTH CASE, RIGHT.—Cretaceous fossils continued. Among Cephalopods are shown specimens of *Nautilus* of modern type; also members of the Ammonite family, which take on various and intricate forms. The series of *Placenticerias*, an ammonite with coiled shells often two feet in diameter, is especially worthy of note. The specimens are chiefly from the Bad Lands of South Dakota. Many varieties of shape are found among the Ammonites, from straight shells to hook-shaped, partly uncoiled spirals, spirals, etc. The genera are often named from their characteristic forms, some of them being as follows: *Baculites*, rod-shaped; *Hamites*, hook-shaped; *Helicoceras*, an open spiral; *Scaphites*, boat-shaped; *Turritiles*, tower-shaped.

Agassiz describes these forms as representing the death convulsions of this remarkable family. It is true that with this age this group, which had so long been one of the dominant types of marine life, became extinct, but the forms show progression up to the time of extinction, and not degeneration.



*Lamellibranchs* and *Gasteropods*, illustrated by many specimens, mostly of modern types—*Ostrea*, or oyster, of many and curious shapes; *Pecten*, *Vola*, *Exogyra*, *Gryphaea*, etc.

Among bivalve mollusks the order of Rudistes is unique, and characteristic of this period. In shells of this order one valve is enormously enlarged, and somewhat funnel-shaped; the other valve is small and acts as a lid—*Hippurites*, *Spherulites*, *Radiolites*. *Inoceramus* also belongs to this order, and sometimes reaches enormous size.

FIFTH CASE, RIGHT.—Cretaceous vertebrates. The specimens include remains of large carnivorous fishes of the Cretaceous seas of Kansas, and of ancient sea serpents (*Platecarpus*).

Tertiary fishes. The specimens include a fine series of beautifully preserved fishes from the Green River, Wyoming beds, also smaller species from Syria and France. They belong to the modern order of *Teleosts* or osseous fishes in which are included the perch, herring, etc.

FIFTH CASE, LEFT.—Tertiary invertebrate fossils. *Flabellaria*, leaves of a palm which grew in the Eocene epoch near Green River, Wyoming. Also, leaves of *Acer*, or maple, and other trees of modern species.

Such remains, with others that are found, indicate that a sub-tropical climate, like that of Florida, prevailed at this period over the Northern United States. Even as far north as Greenland, the climate was so mild that cypress and cedar trees grew in profusion.

*Nummulites*.—These are abundant and characteristic fossils of this period. They are shells of a Rhizopod, which in Europe and Africa form limestones many thousand feet in thickness.

Among univalve mollusks many modern types will be recognized—*Turritella*, *Natica*, *Cerithium*, *Strombus*, etc.

SIXTH CASE, LEFT.—Vertebrate fossils of the Tertiary period. Fossil turtles are represented by carapaces from localities in Nebraska, South Dakota, and South Carolina; also turtle eggs from France.

The *Cetacea*, or whales, of this period, are illustrated by centra of vertebræ of the *Zeuglodon*. Remains of this whale are chiefly found in the Southern States.

The earliest mammals of the period, those of Eocene age, are illustrated by specimens and casts of fossils from the Paris basin.

The mammals of the White River beds of South Dakota of Miocene age are illustrated by teeth, skulls and other bones of *Oreodon*, *Meshippus*, *Elotherium*, *Dinictis*, etc. The *Oreodon*, whose skulls occur in great abundance in the Bad Lands of South Dakota may be described as "a ruminating hog" since it combined characters of the hogs and ruminants. It was probably about the size of a sheep.

The *Elotherium* was also a large hog-like animal of active habits. An exceptionally fine skull is shown.

A fossil bird's egg shown is one of few known.

SIXTH CASE, RIGHT.—Skulls and other bones of *Titanotherium* from South Dakota. This was a huge, rhinoceros-like animal which inhabited South Dakota in Tertiary times. The largest individuals must have been about fourteen feet long and eight feet high. One of the skulls shown, that of *T. ingens*, is the largest and finest of the genus known. Twelve complete vertebrae belonging to this individual are also shown, the long spinous processes of which are worthy of note as explaining how the attachment of muscles needed to hold the huge head in place was accomplished.

FLOOR OF HALL.—A restoration of the skull of *Elephas ganesa*, one of seven species of elephants existing during the Miocene epoch in India. This species is remarkable for the length of its tusks, in this specimen ten feet long.

Complete skeleton of *Mastodon* from Southern Michigan. This was the earliest of elephant-like mammals, differing from the elephant in having a more elongated body, shorter and stronger limbs, flatter cranium and less complex molars. The grinding surfaces of the molars were more or less tubercular, in contrast to the ridges which characterize the teeth of the elephant. Hence comes the name, *mastodon*—*nipple tooth*. The animal probably had no hairy covering to enable it to endure a rigorous climate as did the mammoth. It inhabited chiefly the temperate regions of the United States, where its remains are found in abundance.

## HALL 60.

CENTER OF HALL.—Restoration of *Megatherium Cuvieri*, or ancient sloth. This was a South American Edentate of the Quaternary epoch, which had one hundred times the bulk of any living species of this order. The genus had a wide range during this period, as shown by its bones being found as far north as South Carolina. The species here shown was a huge, clumsy beast, its enormous femur, three times as thick as an elephant's, being used for supporting the animal while with its fore limbs it tore down branches of trees for food.

SOUTHWEST CORNER.—Restoration of *Colossochelys atlas*, a huge turtle which lived in India during the Tertiary period.

NORTHWEST CORNER.—Skeleton of an *Irish Deer*, from Limerick, Ireland—a large Post-Pliocene deer, the bones of which are occasionally found in marl beneath peat beds in Ireland and England. The antlers of this animal have a spread of seven feet, and its height was nearly eight feet.

NORTHEAST CORNER.—A restoration showing the jaws of *Carcharodon*, and within these, for comparison, the jaws of a modern shark. The *Carcharodon* was probably 50 to 70 feet in length.

SOUTHEAST CORNER.—Cast of skull of *Dinotherium*. This was a huge herbivorous animal remarkable for two long-tusk-like teeth, projecting downwards. It combined in its characters and habits some features of the elephant, hippopotamus, tapir and dugong.

SOUTH ALCOVE.—Group of *Daemonelix* or "Devil's Corkscrews." *Daemonelix* is a corkscrew-like fossil found in great quantities over the plains and among the strata of north-western Nebraska. Its exact nature is problematical but the most widely accepted view is that it represents the remains of aquatic plants. According to another theory natural casts of ancient mole burrows form the fossil. The series shown is thoroughly representative, and includes specimens showing successive stages in the development of the form.

WEST ALCOVE.—Invertebrate fossils of the Quaternary period. Prominent among these are large shells of *Ostrea* or-

oyster, now extinct, from North Carolina. They are much larger than the modern forms. There are also numerous specimens from the Quaternary clays of Europe.

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## HALL 61.

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FIRST WALL CASE, RIGHT.—Fossil mammals of the Miocene beds of the Sewalik Hills, India, and of strata in Australia and Argentina of similar age, are here represented by numerous casts. These include casts of skull and limb bones of *Diprotodon*, a huge, ancient kangaroo; casts of skulls of *Toxodon*, *Sivatherium* and *Nototherium*; and of limb bones of *Sivatherium*.

*Toxodon* was a quadruped of huge size, which combined characters of rodents, elephants and whales. Its teeth show it to have been an herbivorous animal and its habits were probably like those of the Manatee or sea cow.

*Nototherium* was an Australian mammal, of the wombat type, though as large as the rhinoceros. It probably had some of the characters of the elephant, and was closely allied to the *Diprotodon*. The humerus indicates that it was a burrowing animal, but it is hard to understand how an animal of so great size could have been of such habit.

*Sivatherium* was a four-horned antelope or giraffe of elephantine size.

FIRST WALL CASE, LEFT.—Remains of the Mammoth and Mastodon, two great elephants which inhabited North America during the glacial period and later. The remains include teeth, tusks and other bones, and a piece of skin, bearing hair, from the Mammoth found encased in ice in Siberia. Comparison of the teeth will show how the Mammoth is distinguished from the Mastodon. The surface of the tooth of the Mammoth is flat and crossed by a number of ridges, while that of the Mastodon is raised into large tubercles which are more or less worn away according to the age of the animal. The great range of these elephants is illustrated by the fact that teeth are shown from South Carolina, Texas, Nebraska, Idaho, and Alaska.

Some excellent tusks from Alaska are shown, found under ground while mining gold in that country.

**SECOND WALL CASE, RIGHT.**—Remains of the huge birds of New Zealand belonging chiefly to the genus *Dinorinus*, which has recently become extinct. A complete skeleton of one is shown, also leg bones of several species whose limbs rival in size and strength those of a horse. Casts of eggs of this and an allied genus, that of the latter having a capacity of two gallons, are shown.

**SECOND WALL CASE, LEFT.**—Fossil vertebrates more or less contemporaneous with Man. Perfectly preserved lower jaw with teeth, also other bones, of Mastodon from Morocco, Indiana. Skulls of fossil Bison and Musk Ox from Alaska. Limb bones and teeth of Hippopotamus and Bison from England, showing that these animals lived in England in comparatively recent times.

Skull of *Ursus spelaeus* or cave bear. This was a bear of great size, frequently not less than nine feet in length, the remains of which are found in Europe in caves with human bones. It was evidently contemporaneous with early man, but has been extinct since historical times.

Remains of *Homo sapiens*, or man, found in a cave on the island of Crete—probably very ancient. Casts of the Neanderthal and Engis skulls, the former of which has given rise to much discussion because of its flattened form. This has been held by some to prove that early man was a being intermediate between man and the ape. The skull has, however, about the average human brain capacity.

**FLOOR OF HALL.**—Restoration of a skeleton of *Dinoceras*, from Wyoming. This was a five-toed Ungulate of elephantine size, though it had no proboscis, and was probably like the rhinoceros in its habits. It is marked by three pairs of protuberances on its skull which probably bore horns. In spite of the size of the animal its brain capacity was very small—only one-eighth that of a modern horse, as shown by a cast in an adjoining case.

Restoration of *Glyptodon clavipes*. This was a giant Edentate, allied to the Armadillo. It existed during Quaternary times in South America. The specimen is 10 feet in length, and its carapace alone had a length of 5 feet.

## HALL 62.

## METEORITES.

The collection of Meteorites includes representatives of about 250 distinct "falls" or "finds," the specimens having an aggregate weight of 5,130 pounds (2,327 kilograms).

These are grouped in three classes, viz.:—Siderites (iron meteorites), Siderolites (iron-stone meteorites), and Aerolites (stone meteorites). Under each of these divisions the specimens are placed in chronological order, and labels show the locality, date of fall or find, and weight of specimen.

The specimens are in large part not the individual stones but fragments of them, it being usual when a meteorite falls or is found, to break it up and distribute the pieces among museums and collectors in order to provide material for study. Otherwise meteorites could be studied only by going from one museum or collector to another. The total number of falls and finds now recognized is about 650.

CASE 1.—*Siderites*. These are meteorites composed chiefly of iron, with varying percentages of nickel, cobalt, manganese, etc. Combined sulphur and phosphorus are usually present. The surface of the siderites is usually smooth as if fused, and more or less indented or pitted. In the interior they have a silvery luster. Polished slabs, upon etching with acid, usually show regular markings called Widmannstätten figures. According to the character of these figures the siderites are further divided into octahedral and cubic irons and the octahedral irons into those of coarse, medium and fine lamellae.

The specimens shown are largely sections from the original masses and most of them polished and etched. The shape of the original mass is often to be seen illustrated by a cast in the adjoining case.

Among the specimens may be noted as of especial interest, the series of Toluca, Mexico, irons, more than twenty masses and slabs of which are shown. Such masses have been ploughed up at intervals about Toluca since 1784. They long furnished a source of iron to the natives, and one of the specimens shown was once in use as a hammer. The Bemdego, Brazil, iron, two sections of which are shown, was also discovered about 1784.



It is a mass of great weight. A large series of individuals from Canon Diablo, Arizona, is shown and some etched slabs. There are also many of the Santa Catharina, Brazil, masses which are much oxidized. These have so high a content of nickel that their meteoric origin has been doubted. Other siderites exhibited in large quantities are the Kenton Co., Ky., 100 lbs., the Indian Valley, Va., and Ellenboro, N. C., almost entire and Los Reyes, Mexico, entire. Widmannstaetten figures of great beauty may be noted on the Lion River, Tazewell, Smith Mountain, Carlton and other sections.

**CASE 2.—*Siderolites*.** These contain metallic and stony matter in about equal proportions and form a transitional group between the siderites and aerolites. Frequently the structure is that of a spongy mass of iron, whose cavities are filled with olivine. Specimens from fifteen localities are shown including one complete individual of the Crab Orchard, Tenn., find.

***Aerolites*.** These are meteorites made up largely of stony matter. The surface is usually black, smooth as if fused, and somewhat pitted. On breaking the thin, black crust which covers the exterior, the interior is generally found to be of a grayish color, with scattered metalliferous particles. Analysis shows these meteorites to be made up largely of olivine, enstatite and other pyroxenes and occasionally feldspar. They have a composition analogous to that of the most basic volcanic rocks of the earth. The presence of metallic grains is a distinctive feature and serves often as a means of identification. Of special historical interest among the specimens shown are fragments of the Ensisheim aerolite which fell in 1492 and is the oldest meteorite the date of whose fall is known, and of the L'Aigle stones which fell as a shower of over 1,000 individuals in 1803 and convinced scientific men for the first time of the fall of stones from the sky. In large quantity are shown specimens of the fall of Saline Township, Kan., Farmington, Kan., Pultusk, Poland, and Winnebago County, Iowa. Of the latter, six hundred and sixty complete individual aerolites are shown. Of remarkable composition is the light-colored Bishopville stone, 7 grams of which are shown. It is made up of nearly pure enstatite. Of the rare carbonaceous meteorites are shown specimens of Orgueil, Mighei and Alais.

CASES 5 AND 6.—Siderolites, from Kiowa County, Kan. Found in 1889. The mass in Case 5 weighs 465 pounds; the largest in Case 6, 344.5 pounds. There are also three smaller masses, and three or four slabs cut to show the structure of the iron, the cavities of which will be seen to be filled with olivine.

CASE 8.—Aerolite from Long Island, Phillips County, Kan. This is the largest single aerolite yet known. The mass struck a ledge in falling and was broken into a large number of pieces. The aggregate weight of the pieces here shown is 1,184.5 pounds. Other portions are known which show the total weight of the original mass to have been over 1,300 pounds. The pitted surface characteristic of meteorites is well illustrated. Some of the surfaces of fracture show "slickensides." Polished sections show metallic grains to be scattered through the mass.

CASES 3 AND 4.—Casts showing form and surface characters of meteorites. Those in Case 3 are largely of aerolites, those in Case 4 of siderites. These casts are made before the meteorite is cut for distribution. Some of the forms possessed by meteorites will be seen to be remarkable, notably that of Babb's Mill, which is cigar-shaped, and those of Hex River Mts. and Kokstad, which have a shape like the lower jaw of a mammal.

PEDESTALS 9 AND 11.—Models of three large iron meteorites found many years ago in the State of Chihuahua, Mexico, and now in possession of the School of Mines of the City of Mexico. These are among the largest meteorites known.

PEDESTAL 12.—Two large masses of Canon Diablo, Arizona, meteorites, weight 1,013 and 265 pounds.

The smaller one is hung by a chain which passes through a natural perforation. This perforation was undoubtedly formed by the fusing out of a nodule of iron sulphide contained in the meteorite, by the heat generated in the passage of the mass through the earth's atmosphere.

These meteorites are also remarkable as containing minute diamonds.

NORTH WALL.—Map showing distribution of meteorite falls in the United States. The apparent paucity of falls in the Western States is due to a lack of population rather than to a lack of falls.

**HALLS 63 AND 64.****SYSTEMATIC MINERALOGY.**

The systematic collection of minerals numbers about 5,000 specimens. The arrangement of the collection is based upon that given in Dana's New System of Mineralogy, a copy of which work may be found in the library. The order which is to be followed in a study of the collection is shown by the numbering of the cases. Thus, entering Hall 63 from the south, the visitor finds Case No. 1 at his or her left, and the order then follows along the west wall through the oxides in Case 4, back on the western side of the center aisle, down the eastern side, and back along the east wall; then passing to Hall 64, the order continues with the phosphates in Case 15 on the western side and ends with Case 17 on the eastern side.

Complete case labels above each case indicate the groups to which the specimens beneath belong, and show the chemical composition and system of crystallization of each species. The specimen labels show the name of the species, its number in Dana's system, its museum number and the locality.

As specimens worthy of especial notice may be mentioned, among the sulphides, Case 1A, the large crystals of stibnite from Japan; among the haloids, Case 3A, the beautiful green and purple fluorites from English and American localities; among the oxides, Case 4, the extensive collection of natural and artificially colored agates from South America; among the carbonates, Case 6B, the magnificent groups of calcite from Joplin, Mo., the curiously distorted crystals, sometimes called "butterfly twins," from Egremont, England, and the brilliant groups of the same mineral from the Big Rig Mine, Cumberland, England; Case 7A, the Flos Ferri aragonites, which look like triumphs of the confectioners art, and the delicately tinged stalactites of the same mineral from the Copper Queen Mine, Arizona; among the silicates, Case 8A, the large crystals of Amazon stone from Pike's Peak, Colorado, and, Case 10B, the transparent and perfect crystals of topaz from Siberia; among the phosphates, Case 15, the richly colored vanadinites from Arizona, and among the sulphates, Case 16, the brilliant groups of barite from Cumberland, England, and of celestite from Sicily.

CASE 13.—A collection of natural and polished specimens of agatized wood from Arizona.

CASE 14.—A large display of the beautiful rubellite in lepidolite from San Diego County, California, and some massive gypsum crystals from a cave in Wayne County, Utah. These crystals are of remarkable size, some being nearly four feet in length, and they are nearly transparent.

CASE 17A.—Collection of pseudomorphs, which illustrate the way in which one mineral may imitate or replace another.

CASES 17B AND C.—Series illustrating the physical properties of minerals, such as form, structure, diaphaneity, lustre, hardness, and specific gravity.

CASES 17D, E, AND F.—A series of crystal models, representing the typical forms and position of the axes in the six systems of crystallization. Together with these are a number of models of crystals of the more common mineral species, and some of the crystals themselves. The models are mounted in their true crystallographic position, and are intended to illustrate the crystal forms which characterize the common minerals.

CASE 17G.—A series of models of gold nuggets of remarkable size.

CASES 18 AND 19.—Crystals of fluorite and quartz of exceptional size and beauty, from various localities.

CASE 21.—Group of amethyst crystals from Thunder Bay, Lake Superior.

CASE 22.—Slab of lapis lazuli from Peru, probably the largest single block ever quarried.

FLOOR CASES.—Cut gems and ornamental stones. About 200 specimens of cut topaz, amethyst, emerald, tourmaline, moonstone, rock crystal, amber, alabaster, etc., are shown. The specimen of carved amber is a remarkable piece of lapidist's work. Series of jasper trays and vases from the Urals. Objects of polished serpentine and onyx.

Chalmers' Crystal Collection. This includes about 250 specimens of crystals from United States' localities illustrating varieties of crystal form and habit. It is the most complete and choicest collection of the kind ever made.

## HALL 65.

**STRUCTURAL AND DYNAMICAL GEOLOGY.**

The specimens here shown (together with those in Hall 66), illustrate the materials of the earth's crust and the processes of change which they undergo. They also illustrate many striking phenomena met with in the study of the earth's crust which are sometimes grouped under the title of Phenomenal Geology.

CASE 1.—Dendrites—arborescent impressions on rocks of all kinds, which have often the beauty of a drawing. They are produced by the deposition of oxides of iron or manganese on a stratum over which waters containing these minerals have spread.

Cave products, including stalactites and stalagmites from various caves, together with gypsum, epsom salts and other interesting minerals formed in caves. Stalactites of sulphur, galena, barite, etc.

Specimens illustrating metamorphism, which may be produced by pressure, as where chalk is changed to limestone, or by chemical changes, as where pyroxene alters to serpentine. Cementation, illustrated by specimens of coquina of various types, of trass, and of conglomerates varying in degree of consolidation.

Stratified structure. Well illustrated by numerous specimens of sandstone from the Black Hills, the colors of which bring out the strata clearly. Faults, produced by rock movements on planes inclined to those of the strata, are illustrated here, also in Hall 66.

Cellular structure. Illustrated by lavas and scoriae. Where the cells have become subsequently filled with mineral matter, amygdaloidal structure is produced.

Specimens illustrating effects of erosion by wind and water, also stages and forms of rock weathering. Ripple marked surfaces of exceptional size and degree of perfection. Surfaces showing mud cracks and rain drops. "Slickensided" surfaces.

Specimens illustrating glacial action, including glaciated pebbles and boulders from the drift of Chicago, Rochester, N. Y., and other localities. Rock surfaces planed and striated by glacial movement. Similar specimens from regions of modern

glaciers, such as Porfirio Diaz glacier, Mexico, and the Mer de Glace, Switzerland.

CASE 2.—Types of structure. Jointed structure. Illustrated by basalt from Mt. Holyoke, Mass., Auvergne, France, and other localities.

Jointed limestones and conglomerates. In one of the latter specimens the joint planes cut quite through the pebbles of the conglomerate, showing that the jointing has occurred subsequent to the formation of the conglomerate. Specimens illustrating cone-in-cone structure and stylolites. These are formed probably by local pressure.

Sand and limonite concretions from many localities. These have imitative shapes and hence are often taken for petrified objects of animal or vegetable origin.

CASE 3.—Septaria. These are formed by the drying and shrinking of concretions and subsequent filling of the cracks with calcite. When cut and polished, as shown, they are objects of great beauty.

Large collection of geodes chiefly from the Keokuk, Iowa, beds. These are hollow, concretionary formations lined frequently with sparkling crystals of quartz.

CASE 4.—Cave formations and cave life. Stalactites, stalagmites and cave formations chiefly from Wyandotte and Margeno Caves, Indiana, mounted in natural position so as to illustrate form and details of a typical limestone cave. Bats, blind fish, cray-fish and crickets are exhibited in the "cave," showing living forms characteristic of such areas.

CASE 5.—Large specimens of types already mentioned. Series of slabs illustrating glacial scoring and polishing of limestone obtained in the excavations for the Chicago Drainage Canal. Large concretions and septaria, and large ripple-marked slabs.

Upon the wall are framed specimens of the so-called ruin marble, a rock in which the natural faulting and coloring have been such as to give to a slab an appearance like a painting of a ruined city.

FLOOR OF HALL.—Case of specimens of clay concretions from various localities, showing varieties of form and size.



Collection of basalt columns from the Giant's Causeway, Ireland, and the Rhine Valley. The grouping of these is intended to illustrate the stair-like arrangement which usually characterizes cliffs of basalt. The columns are entirely of natural formation, being produced by the shrinkage of the basalt in cooling.

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## HALL 66.

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### LITHOLOGY.

The collections shown in this Hall aim to illustrate the different varieties of rocks as they are known to petrographers and also to exhibit the characteristics of these rocks and their order of succession as they appear in different localities.

About 2,000 specimens are shown, most of them being of the uniform size adopted by petrographers—3 x 4 x 1 inch.

The specimens are classified under the heads of Eruptive, Aqueous and Metamorphic rocks. The Eruptive rocks are those which have been formed at great depths, and were once in a state of igneous fusion. Being most deeply seated they may be considered to be the primary rocks of the earth's crust, so far as it is known. From these, aqueous agencies form the Aqueous rocks by erosion and deposit, or by chemical precipitation. The latter in turn may be changed to Metamorphic rocks by dynamical and chemical agencies, which, however, do not usually destroy the lines of stratification.

CASES 1, 4, 5, AND PART OF 6.—Eruptive rocks. The classification which has been adopted for these is based upon the following plan:

First, an arrangement according to the percentage of silica. The highest in silica, or acidic rocks, are placed at the beginning of the series, then those having lower percentages and, last, the lowest, or basic rocks.

Thus, beginning with the granites, which have from 80 to 65 per cent. of silica, we pass among the coarse-grained rocks to the diorites, which have between 65 and 55 per cent., then to the gabbros and diabases, having usually more than 45 per cent. and end with the peridotites, having below 45 per cent. A corresponding series begins with the syenites, and ends with the nepheline rocks.



Second, under the divisions representing different percentages of silica, a vertical arrangement is adopted by which the coarse-grained or holocrystalline rocks are placed first, then those of finer grain or those having a porphyritic structure and, last, the amorphous rocks. Thus among rocks having from 80 to 65 per cent of silica, the granites, being coarse-grained, are placed first in the vertical order, the granite porphyries second, and rhyolite, nevadite, obsidian, etc., which are amorphous, last.

CASE 1.—First row, *granite* and its varieties, such as *granitite*, *graphic-granite*, etc. These are rocks having quartz, potash-feldspar, and one or more minerals of the mica, amphibole, or pyroxene groups as essential constituents.

Second row, *granite-porphry*, *quartz-porphry*, *vitrophyre*, *felsophyre*, etc. Like the preceding in composition, but more or less porphyritically developed.

Third row, *rhyolite*, *nevadite*, *pumice*, *obsidian*, etc. These are amorphous volcanic rocks, having high percentages of silica, usually more than 70 per cent.

The order of the series now passes on to Case 5, described on page 47.

It is interrupted in the numbering of the cases in order to give place to some collections illustrating rock regions and to the syenite-nephelinite series.

CASE 2.—Collection of rocks of the copper and iron-bearing regions about Lake Superior.

Rocks of Manhattan Island. These were obtained chiefly from excavations made in and about New York City. They are crystalline, metamorphic rocks, and illustrate the great variations possible in kinds of rock in a small region.

UPPER PART OF CASE 2.—Lavas of well-known volcanoes, including Vesuvius, Mauna Loa, and the extinct volcanoes of Central France.

CASE 3.—Lavas and other volcanic products of the volcanoes of the Valley of Mexico.

Rocks of the Green Mountain Range, as seen in passing eastward from Pittsfield, Mass. These include a variety of schists, limestones and other metamorphic rocks ranging in geological time from the Archaean into the Devonian. They illustrate the different formations distinguished by geologists in the region.

CASE 4 AND PART OF 5.—*Syenite-nephelinite* series.

FIRST GROUP.—First row. *Syenite*, *minette*, etc. Holocrystalline rocks, having orthoclase and biotite as essential constituents.

Second row. *Trachytes*. Tertiary eruptive rocks, characterized by the predominance of an alkaline feldspar, usually sanidine, and freedom from quartz. An iron-bearing mineral is also usually present.

SECOND GROUP.—First row. *Nepheline* or *elaeolite syenites*. Rocks composed of nepheline, orthoclase, and usually a pyroxenic mineral and plagioclase feldspar.

Second row. *Phonolites*, rocks consisting of an alkali feldspar, with minerals of the nepheline and leucite groups, and usually a monoclinic augite.

THIRD GROUP.—*Tephrites* and *basanites*, rocks having nepheline or leucite and lime-soda feldspar as essential constituents. They are usually porphyritic in structure, with a more or less amorphous ground mass.

FOURTH GROUP.—*Kersantite*, *leucite basalt*, *leucitite*, *nepheline basalt*, and *nephelinite*. Rocks containing leucite or nepheline in place of feldspar, and these usually associated with augite.

CASE 5 AND PART OF CASE 6.—FIRST GROUP. *Diorite* and *varieties*—holocrystalline rocks, having plagioclase feldspar and hornblende or black mica as essential constituents.

Second row. *Andesites* and *dacites*, amorphous or porphyritic rocks composed of soda-lime feldspar, black mica, hornblende, and in the case of the *dacites*, quartz.

Third row. *Porphyrites* of various kinds.

SECOND GROUP.—First row. *Gabbros* and *norites*. Rocks consisting of a basic soda-lime feldspar, with diallage or other pyroxene.

Second row. *Diabases*, rocks having plagioclase feldspar and augite as essential constituents.

Third row. *Basalts*, *dolerites* and *melaphyres*. The former are common rocks widely distributed in the form of dykes and intrusive sheets. They are popularly known as trap rocks. Their composition is like that of the preceding.

THIRD GROUP.—First row. *Pyroxene rocks*, *diallagite*, etc. Basic rocks, composed largely of pyroxene.

Second row. *Peridotite* and varieties, including *lherzolite*, *picrite* and *dunite*. These are highly basic rocks, composed chiefly of olivine, but having chromite and other iron oxides usually present.

REMAINDER OF CASE 6 AND CASE 7.—Aqueous rocks. Rocks formed as chemical precipitates are placed first. These include *hematite*, *limonite*, *calcareous tufa*, *oolitic and pisolitic limestones*, *onyx*, *serpentine* and its varieties, *talc* or *steatite*, including *verdantique marble* and *ophite*, *gypsum*, *alabaster*, etc.

Then follow rocks formed as sedimentary deposits, and fragmental in structure. The principal varieties of these are arranged in this order: *Sandstones*, *conglomerates*, *breccias*, *quartzites*, *shales*, *clays*, *tufas* or *tuffs*, *coquina*, *chalk* and *limestones*.

CASES 8, 9, AND 10.—Metamorphic rocks.

These are divided into the stratified or bedded, and foliated or schistose.

The first class includes *crystalline limestones*, *marbles* and *dolomites*. They are made up chiefly of the mineral calcite, and are formed from the remains of mollusks, corals and other animals. These produced limestone first and this was changed by the action of heat to the crystalline condition. In some cases the original fossils remain intact, as is illustrated in many of the polished slabs.

UPPER PART OF CASE 9.—Specimens illustrating rock texture, veins, rock folding. A series of wooden models illustrates structures produced by faulting.

LOWER PART OF CASE 9 AND CASE 10.—Following the *marbles* are placed the *crystalline schists*, which are rocks of variable composition, but characterized by a pronounced schistose structure, especially where mica is the prevailing constituent. Here are included *argillite*, *clay-slate*, *eclogite*, *quartzite*, *phyllite*, *paragonite schist*, *chlorite schist*, *mica schist*, and others.

Last in the series appear the *gneisses*, a class of rocks essentially like the granites in composition, but differing from them in structure, in that the constituents are arranged in approximately parallel bands or layers. These are the oldest of crystalline rocks, and are considered by many to represent por-

tions of the primeval crust. Others, however, regard granites as the last term in the metamorphism of such rocks, and for that reason the gneisses have been placed in juxtaposition to them. *Varieties of gneiss*, based upon the prevailing mineral, whether *biotite*, *muscovite*, *hornblende*, or others, are included here.

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## HALLS 76 AND 77.

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### GEOGRAPHIC GEOLOGY.

The purpose of this collection is to illustrate in a vivid and realistic way the surface configuration of the earth. The chief feature of the exhibit is a series of relief maps which reproduce on as natural and representative scales as practicable, the topography and structure of selected portions of the earth's surface. A part of the series shows only topography and sculpture, while another part shows geological structure as well as topography. To some extent, the topography is shown on one map and the geological structure on another, so that both elements are represented with the greatest distinctness. The portions of the surface selected to be represented are usually such as to portray some typical form of surface sculpturing or of volcanic accumulation. Some, however, represent natural or political divisions.

In addition to the relief maps, there are models showing geological structure or illustrating methods of development. Some of these are dissected so as to show the more intimate structure of the formations. There are also exhibited globes, wall maps, and other geographic material. The following is a list of the principal features:

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## HALL 76.

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Entering this hall from the West Dome and passing around to the right, the maps against the wall will be found in the following order:

Relief map of Kentucky showing topographical and geological features and location of principal coal fields.

Relief map of the United States showing limits and theoretical curvature of the ancient ice sheet at the stage of the Glacial Period following the main epoch. Modelled on a section of a globe  $16\frac{1}{2}$  feet in diameter. Scale, 1 inch equals 40 miles.

Relief map of Missouri showing topographical and geological features and principal mining districts.

Relief map of New Jersey showing topographical and geological features.

Model of Henry Mountains and vicinity, Utah, showing geological formations and effects of erosion.

Geological and relief map of the Henry Mountains showing effects of erosion.

This is on a larger scale than the preceding map and shows only a portion of the same territory.

Same as the above, ideally restored before erosion took place.

Model showing Henry Mountains and vicinity ideally restored before erosion took place.

This is on the same scale as the first of the series.

The foregoing series of four maps illustrates the formation of laccoliths or dome-like mountains produced by the intrusion of lava.

Relief map of Yellowstone National Park, showing Canons of the Yellowstone and Madison rivers, etc. Horizontal and vertical scale, 1 inch equals 1 mile, or 1: 63,360.

Relief map of the Yosemite Valley from surveys made by Captain of Engineers, George M. Wheeler, U. S. A. Scale, 1 inch equals 1,000 feet.

Relief map of Eureka District, Nevada, colored to show geological formations. Scale, 1 in. equals 1,600 feet.

Relief map of the island of Porto Rico. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 2 miles.

Relief map of the Hawaiian Islands. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 2 miles.

Relief map of Niagara Falls and vicinity. Horizontal and vertical scale the same; 1 inch equals 500 feet. This map, besides exhibiting the familiar features of the Falls and Gorge, also makes plain the ancient shore of Lake Erie and the old channel leading from the Whirlpool.

Relief map of the United States and the Gulf of Mexico, modeled on a section of globe  $16\frac{1}{2}$  feet in diameter. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 8 miles.

Note that the true outlines of the continent extend much beyond the present coast line and seem to include the West Indies.

Relief map of the Grand Canon of the Colorado and the cliffs of Southern Utah, colored to show geological formations. Horizontal scale, 1 in. equals 2 miles. Vertical scale, 1 in. equals 5,000 feet.

Relief map of Palestine. Horizontal scale,  $\frac{3}{8}$  of an inch equals 1 mile. Vertical scale,  $3\frac{1}{2}$  times the horizontal.

Mounted on easels and occupying the floor of the hall will be found the following:

Contour map, in relief, of the Washoe, Nevada, mining region, 50 foot contours. Scale, 1:20,000.

This form of map illustrates how a relief map is constructed from a printed contour map. By filling the contours here shown the ordinary relief map is obtained.

Relief model of Leadville and vicinity, showing geological structure. Scale, 1 in. equals 800 feet, or 1:9,600.

A dissected form of this map, useful for the study of folding and faulting, can be seen on application to the Curator.

Relief map of the Ice Spring craters, a group of extinct volcanoes near Fillmore, Utah, illustrating the successive formation and partial abolition of craters and lava fields. Horizontal and vertical scale, 1:1,000.

Relief map of Mount Taylor, New Mexico, showing geological formations. Scale, 1 in. equals 1 mile.

Relief map of the Unita and Wasatch Mountains, colored to show geological formation. Horizontal scale, 1 in. equals 4 miles, or 1:253,440. Vertical scale, 1:126,720.

Relief map of the high plateaus of Utah, colored to show geological structure. Scale, 1:1,680,000.

Two relief maps of Mount Shasta, one showing topographical, the other, geological features.

Relief map of France with detail of post roads and towns. Horizontal scale, 1:640,000. Vertical scale, 5 times the horizontal.

Relief maps of the Chattanooga District, one showing topographical, the other geological features. Note how, by folding and erosion, the formations originally overlying one another have been exposed so as to succeed one another laterally.

Relief map of Massachusetts, from maps of the United States Geological Survey and the Topographic Survey of Massachusetts. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 4,000 feet.

Relief map of Connecticut from maps of the United States Geological Survey and the Topographic Survey of Connecticut.

Relief map of the Caucasus Mountains.

Relief map of the World on Mercator's Projection. Horizontal scale, 630 miles to 1 inch. Vertical scale, 78 times the horizontal.

Relief map of Palestine. Horizontal scale, 1 inch equals 6 miles. Vertical scale, exaggerated 5 times.

A terrestrial globe four feet in diameter.

There is also exhibited in this hall, a model on a large scale of the Chandler iron mine, Ely, Minnesota. It illustrates how the underground workings of a large mine are carried on. Two shafts (shown at the rear of the model) run from the surface downward. At levels 60 feet apart, horizontal galleries run from the shaft and connect at intervals with other passages. Figures of miners at work may be seen by looking through these cross-ways from the ends of the model. From the two main galleries, sloping ways, not shown in the model, lead upward to passages at higher levels which do not connect with the shaft. Here as the ore is excavated it is thrown through chutes to the tramways of the main galleries, and there taken by ore cars to the shafts and raised to the surface. The timbering is to prevent the top and sides from caving.

Upon the wall is a large painting representing a section of the Soudan Mine of Tower, Minn.

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## HALL 77.

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Passing into Hall 77, and turning to the right, maps will be found against the wall in the following order:

Geological relief map of the Island of Teneriffe.



Relief map of Carmel Bay, California, showing a submarine valley.

Geological relief map of Vesuvius and Monte Somma.

Relief map of the Drainage basin of the Arkansas river in Colorado, showing the relations of the catchment basins to the reservoir sites and irrigable lands.

Relief map of Europe. Horizontal scale, 85 miles to 1 inch. Vertical scale, 45 times the horizontal.

Relief map of Asia. Horizontal scale, 216 miles to 1 inch. Vertical scale, 39 times the horizontal.

Relief map of Africa. Horizontal scale, 184 miles to 1 inch. Vertical scale, 53 times the horizontal.

Relief map of North America. Horizontal scale, 140 miles to 1 inch. Vertical scale, 39 times the horizontal.

Relief map of South America. Horizontal scale 147 miles to 1 inch. Vertical scale 30 times the horizontal.

The foregoing maps enable one to study to advantage the great features of continental relief. Among those that may be noted are—that the continents in general have elevated mountain borders and a low or basin-like interior; that the highest border faces the larger ocean; that the lines of greatest elevation are placed outside the center; that all the gentle slopes descend toward the Atlantic and the Frozen Ocean, all the steep ones toward the Pacific and Indian Oceans; that the elevations go on increasing from the poles to the tropics.

Relief map of the United States. Horizontal scale 85 miles to 1 inch. Vertical scale, 36 times the horizontal.

Relief map of the United States. Horizontal scale, 1:2,500,000. Vertical scale exaggerated 10 times.

Geological map of Canada. Colored to show formations.

Physical map of the British Isles.

Geological map of Russia.

Geological map of the State of Illinois.

Series of four maps showing the successive stages in the recession of Lake Chicago, following the Glacial Period, and the development of the Chicago plain. Former beach lines, spits and islands are well marked by the topography.

Relief map of Northwestern Illinois, including Cook, Du Page, Will and eighteen adjoining counties. The course of the Chicago Drainage Canal is shown.

Relief map of the region of extinct volcanoes in Auvergne, Central France; geological and topographical. Henri Le Coq and G. P. Scrope.

Geological map of the Siebenburgen region, Bohemia, by Von Hauer. This map is an illustration of good coloring.

Geological map of the state of New York.

On tables occupying the floor of the hall will be found the following:

Harvard geographical models, showing the effect of submergence and elevation of a coastal region.

Ideal relief of a complete glacier.

Ideal relief illustrating the formation of valleys by erosion.

Ideal relief of a volcanic island.

Ideal relief of a steep coast and dune coast, showing the two principal types of sea coast as they appear at ebb tide.

Geological relief map of Mount Aetna.

Geological relief map of the Island of Bourbon. Scale, 1:300,000.

Geological relief map of Blair, Bedford and Huntingdon counties, Pennsylvania. A portion dissected to show geological structure.

Geological relief map of the Island of Palma.

Relief map of a part of Mount Desert Island, Maine. Scale, 1 to 40,000.

Relief map of Mont Blanc. Horizontal scale,  $\frac{3}{4}$ -in. equals 1 mile. Vertical scale,  $1\frac{3}{4}$ -in. equal 1 mile.

Model showing irrigation by ditches and furrows on steeply sloping fields.

Profile relief map of the Sentis Mountains, northwestern Switzerland, showing mountain contour and geological structure.

A complete series of the topographical maps issued by the U. S. Geological Survey is kept in drawers beneath the tables, access to which can be obtained on application to the Curator.

## DIVISION OF ECONOMIC GEOLOGY.

It is the purpose of the collections shown in this Division to illustrate modes of occurrence in Nature of the minerals and ores which have economic importance, to show the localities from which they are obtained, the processes used in their extraction

and treatment, and their application to human arts and industries.

The specimens have for the most part been gathered from exhibits made in the Department of Mines and Mining of the Columbian Exposition, and were secured to the Museum by the Chief of that Department.

They may be conveniently classified into five groups, which can be most readily inspected in the order named:

Building stones and quarry products, Hall 67.

Carbon minerals, including coals, petroleum, etc., Halls 69, 70 and 71.

Ores and products of the precious metals and lead, Hall 72.

Ores and products of the base metals, Hall 79.

Clays and sands, Hall 78.

Salts of the alkalies and alkali earths, Hall 68.

There are also included in this Division, a Departmental Library and Laboratory, and the office of the Curators.

In the arrangement of the collections a series of type specimens of each group of minerals is placed first. Then follow specimens illustrating different localities, arranged in geographical order, passing eastward from California. Then are illustrated, so far as the material at hand permits, processes of reduction and finished products showing the uses of the metal or mineral.

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## HALL 67.

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### MARBLES AND BUILDING STONES.

This hall contains a collection of the best known foreign and domestic marbles in the form of polished slabs. The names given on the labels are those by which the stones are commonly known, and in general refer to the color and markings of the stone rather than to the composition or the locality where it is quarried.

CASE 1A.—“Winooski Marbles,” mottled red dolomite quarried in the vicinity of Swanton, Vt.

Other Vermont marbles.

CASE 1B.—Marbles from Norway and Greece.

CASE 2.—Marbles, France.

France is noted for the beauty and variety of its marbles. Examples of many of the marbles used in the ornamentation of our houses and public buildings may be recognized in this case.

The names upon the specimen labels are in large part descriptive—that is, made up of terms applicable to a class of marbles. Thus *Rouge Antique* is a red marble of the shade found in the Roman ruins.

*Griotte*, the name of a variety of cherry, is applied to marbles having markings suggesting a mass of ripe red cherries.

*Jaspe* refers to specimens of the color of Jasper.

*Breche*, or breccia, is applied to those marbles which appear to be composed of angular fragments cemented together.

*Brocatelle* is said to refer to a kind of cloth. Marbles having the appearance of any of the brocatelles shown here may with propriety be called brocatelle.

*Campan* marbles are those showing a peculiar green network of veins.

A *Coquille marble* is a shell marble.

Other names are either simply descriptive, refer to localities or have no especial significance.

CASE 3.—Marbles, Italy. Among these are some used by the ancient Romans.

CASE 4.—Marbles, Africa. Serpentine. Next to marble the green or red serpentine is perhaps the most generally used of ornamental stones. Especially noteworthy are the curiously mottled red and dark green serpentine from Lizard Point, Cornwall, and the dark colored variety from Saxony which is turned on a lathe to form various ornamental objects.

CASE 5.—Verde antique, ophite. The green serpentine seen in this case are now commonly known as verde antique, although the name was formerly applied only to those of the shade of green possessed by the Greek specimen E 504. The ophite from New York is a granular mixture of calcite and serpentine.

CASE 6.—Travertine (*onyx marble*. *Mexican onyx*.) and stalagmite marble. The clear translucent specimens represent the travertine as originally deposited. The opaque red-brown

effects are produced where air has had long access to the material in the ground and has caused oxidation of the iron contained in the specimens.

CASE 7.—Marbles, United States. The most widely used United States marbles, all of which are illustrated here, are the Vermont, Georgia and Tennessee marbles. The Vermont marbles are fine textured and range in color from pure white through gray to black. The coarsely crystalline, brilliant marbles from Georgia run from white into the pinks. It must not be thought from the appearance of the case that colored marbles, such as appear in the collection from foreign localities, do not exist in the United States. Deposits are known but for various reasons remain unworked.

CASES 8 AND 9.—Marbles and gypsums, Great Britain and Japan. The best known of these is the encrinal marble of Devon, England.

The spheres are manufactured in Japan and exported as curiosities.

CASE 10.—Granites and eruptive rocks.

Owing to their hardness and the consequent expense of working, these stones are not so frequently polished as the marbles, but, as illustrated by these specimens, when polished they often present very beautiful effects.

CASES 11 TO 15 contain a systematic collection of building stones in the form of four-inch dressed cubes.

CASE 11.—Limestones and marbles. Four-inch cubes of many of the limestones and marbles of the United States used for building.

CASE 12.—Sandstones. Four-inch cubes of many of the sandstones of the United States used for building purposes.

CASE 13.—Granites. Four-inch cubes of many of the granites of the United States used for building purposes. The above four kinds of rock constitute nearly all the valuable building stones used in temperate climates.

CASE 14.—Building stones of Mexico and Ecuador. These are mostly volcanic rocks, lavas and tuffs, which are sufficiently durable for mild climates and yet soft enough to be easily worked with simple tools. The building stones from Ecuador are ordinary pumice-stone.

CASE 15.—Foreign building stones. Roofing slate.

Specimens of slate from the Welsh quarries illustrate the manner in which blocks of slate are split or cleaved into a series of laminae or thin plates, which may be afterwards cut to uniform sizes and used for roofing.

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## HALL 68.

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### CLAYS AND SANDS.

*Kaolin* or Clay is the basis of most of the specimens shown in this room.

CASE 1.—Sand and cement. A collection showing all stages in the manufacture of Portland cement. A collection showing varieties of sand adapted to different uses, such as molding sand for molds for metal castings; pure sand for infusible furnace hearths and furnace bricks; sand for the manufacture of glass, etc.

CASES 2 AND 4.—Briquettes. These are miniature bricks made from a great variety of foreign and domestic clays and designed to illustrate the variety in color, density and other characters of bricks made from these clays.

CASE 3.—Natural pigments used for paints. The greater number are ochres or clays colored red, yellow or brown by oxides of iron and manganese.

CASES 5, 6, 8 AND 12.—Brick clays. Brick clays are the common clays. Any clay that can be molded and will bake to brick without deforming or cracking may be used as a brick clay. Such clays are usually very impure.

CASE 7.—Soils. A collection designed to illustrate the formation of soils from rocks—and to show the different kinds of soils and their compositions.

CASE 9.—Fine clays. These include the porcelain and china clays, pipe and paper clays with fuller's earth and other clays suited to special uses.

CASE 10.—Fire clays and objects made from them and designed to withstand intense heat.

CASE 11.—Composition of clays. A collection designed to show what are the usual components of clays and what effect

the ordinary impurities have upon the usefulness of the substance.

Meerschaum. This is not a clay but is included here on account of its use for pipes.

Other clay-like minerals including allophane and halloysite.

## HALL 69.

### COALS OF THE UNITED STATES.

Here one may study the distribution and extent of the coal fields of the United States, also the kinds of coal produced by each and the available means of transportation.

On a large plate-glass map in the center of the hall, scale ten miles to one inch, the coal fields of the United States as at present developed are indicated by areas in black, and the principal railroads connecting them are also represented.

CASES 1-18.—Specimens taken from these different fields, the exact locality of each being shown by figures on the labels corresponding to those on the map. The order of numbers is the same as the alphabetical order of the States. The specimen labels show the uses of the coal, the names of the operators of the mines, the means of transportation, the markets, and the analysis of the specimens. Other data will be given to any one desiring to obtain them, on application to the Curator.

## HALL 70.

### COALS AND HYDROCARBONS.

This hall contains a series of the carbon minerals, beginning with the diamond, and passing through graphite, the coals (anthracite, semi-anthracite, semi-bituminous, bituminous and lignite) to bitumen and asphalt.

CASE 1.—Diamonds from Kimberley Mines, South Africa. "Blue ground" or matrix in which diamonds occur, from De Beers mines, Cape Colony, South Africa. Graphite.

CASE 2.—Asphaltum minerals. Oil shale.



CASE 3.—Rocks of the Saarbrucken Coal Fields of Germany. These form a typical series illustrating the rocks of a coal basin.

CASE 4.—Peat and its uses. In this case are shown raw peat and stages in the process of making a fuel from it and of manufacturing it into textile fabrics and paper.

CASE 5.—Lignites and Bituminous Coals from the Eastern States and Colorado.

CASE 6.—Bituminous Coals from the Western States and South America.

CASE 7.—Bituminous Coals from England. Coal from the Saarbrucken Coal Fields, Germany.

CASE 8.—Bituminous Coal from the Westphalian Coal Fields, Germany. Series illustrating the grading and cleaning of coal by washing. Anthracite Coal. Cannel.

CASE 9.—Asphalt and Cannel.

CASE 10.—Section of coal seam five feet in thickness, from the Bore Hole seam, Duckenfield and Merthyr collieries, New South Wales.

CASE 11.—Large blocks of anthracite and bituminous coal.

## HALL 71.

### PETROLEUM AND ITS DERIVATIVES.

This hall contains a very complete collection made by the Standard Oil Company to illustrate modes of occurrence in nature of the mineral oils of the United States, the methods used for distilling and refining them and the products obtained. It contains specimens of crude oil from the majority of the pools in the United States; specimens of various oil-bearing sands and minerals of the oil strata; models of oil refineries and a complete series of the products of petroleum. By following the order given below, the visitor will find illustrated: (1), the natural history of petroleum; (2), its manufactured products, and (3), the uses or applications of these.

CASES 1, 2, 3 AND 4.—Crude petroleum.

The specimens are arranged to show gradations of color, this being seen to vary from black, through shades of dark

green and brown, to amber, the greenish brown being most common.

**EAST WALL.**—Tubes filled with drillings from the successive strata passed through in search for oil. One of these represents a huge producer in the MacDonald field. A piece of the sandstone from which the oil is obtained is placed at the bottom.

**WEST WALL.**—Chart showing a geological section between Olean, N. Y., and Fort Wayne, Ind. Note the position of the oil bearing sands in these and the comparatively undisturbed condition of the strata. Such conditions have been favorable to the storage of vast quantities of petroleum and gas.

**SOUTH WALL.**—Chart showing a geological section between Olean, N. Y., and Massillon, Ohio.

**CASES 5 AND 6.**—Specimens of oil-bearing rocks from a large number of localities. Besides sands will be seen limestones and sandstones, which show that compact rocks may carry petroleum as well as loose sands.

**CASE 7.**—Minerals and fossils of the oil bearing strata.

**CASE 8.**—A large bottle—the largest ever blown—representing one barrel of petroleum.

**CASES 9, 10 AND 11.**—The products of the barrel of petroleum represented in Case 8, arranged according to the order in which they are obtained. These are (1), naphtha; (2), burning oils, and (3) residuum or petroleum tar. The processes and products of further distillation of the latter will also be seen.

**CASE 12.**—Model of a modern oil refinery.

Above this model will be seen one of the original refinery, built in Cleveland, O., in 1863.

The cases following show various finished products ready for sale, these being chiefly illuminating and lubricating oils with, however, a large variety of other useful articles.

**CASES 13 AND 14.**—Fifty-six varieties of burning oils, showing the standard required by law in the several different States.

**CASE 15.**—Cylinder oils of many grades. These are the heavier, more sluggish lubricating oils.

CASE 16.—Special grades of lubricating oils. These include spindle, sewing machine, screw cutting and engine oils. They are light bodied and quick feeding as compared with the cylinder oils.

CASE 17.—General heavy oils, including miners' oil, leather oil and various engine oils.

CASES 18 AND 19.—Bye-products of petroleum. These include paraffine wax, crude, semi-refined and refined, with illustrations of its uses for candles, matches, tapers, etc; axle grease, lantern oil, harness oil, "miners' sunshine," for miner's lamps; vaseline products, such as cerates, pomades, soaps and face paints.

CASE 20.—Special grades of illuminating oils. These oils are designed to give the best light obtainable from kerosene. They are liquids of remarkable purity and brilliancy, the two finest being hardly distinguishable from distilled water in color.

CASE 21.—High test illuminating oils.

CASE 22.—Illustrations of some of the uses to which petroleum products are put. These include waxed paper for wrapping purposes, water proof coating for explosives, varnishes, wood stains and fillers, solvent for rubber cement, electric light carbons, and electrode.

A series of Russian petroleums is also exhibited in this case.

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## HALL 72.

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### PLATINUM, GOLD, SILVER AND LEAD.

The collections in this Hall comprise platinum, gold, silver and lead ores. Besides the typical ores many unique occurrences are represented here. In the examination of these, as well as ores of other metals, it should be remembered that the mineral or metal is frequently present in such minute quantities that it cannot be seen by the naked eye or even with the aid of an ordinary magnifying glass. Ores of the precious metals are commonly, however, associated with certain mixtures of common and otherwise valueless minerals, known as gangue minerals, and by a careful observation of which associated minerals and of the neighboring rocks, the skillful observer may frequently recog-

nize the presence of valuable metals. Opportunity is given by the numerous examples shown in this hall to study the slight indescribable variations in the appearance of a mixture of gangue minerals, which often indicate the presence or absence of the precious metals. It should be said, however, that all indications of this kind are often more or less deceptive and the only positive proof of presence or absence of gold or silver is to be found in actual trial by assay.

The above observations do not apply, however, to the lead ores, which are readily recognized by one having acquaintance with the lead-bearing minerals.

This hall also contains a collection of products from the metallurgical treatment of ores. These are so arranged that the separate steps in the treatment of the ores may be followed by the visitor.

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### PLATINUM.

CASE A.—Specimens illustrating modes of occurrence of platinum in nature, from over twenty different localities, including Washington, Oregon and California, the United States of Colombia and the Ural Mountains. In all of these specimens the metal may be seen in the form of flattened grains often associated with iridium, osmium, palladium, gold, copper and chromite. The grains are usually found in river beds or placer deposits. A complete series of rocks and soils bearing platinum, from the Demidoff Platinum Mines, Nizhni Tagilisk, Ural Mountains is shown, as well as a series of concentrates produced by washing these in order to separate the metal. Some unusual uses of platinum are illustrated as follows: Russian platinum coin for a time used as money; coins struck in platinum and gilded which passed for gold in Portugal and Spain during the past century; imitation gold dust made of platinum grains plated with gold.

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### GOLD.

CASE 1.—Type specimens showing modes of occurrence of gold in nature. These are—*crystallized gold*; *free gold* in the vein-stuff; *pyrite* containing gold disseminated through its sub-

stance in invisible particles; *gold combined with tellurium* in sylvanite, petzite, etc., (*telluride ores*); and *placer gravels* in which the gold occurs as particles scattered through gravel and sands. A more extensive exhibit of placer gold may be found in Hall 32.

With each specimen there is a glass tube containing the substances which form the mineral in the exact proportions in which they occur in the actual ore.

Many minerals other than those shown here are gold-bearing, but the gold in them occurs as microscopic inclusions in some one or more of the minerals exhibited in this case.

Gold, silver, lead and copper are so frequently associated in the same ores that it is impossible to draw a sharp line between the deposits of these metals. Hence it will be observed that in the space devoted to gold ores, the specimens frequently carry much silver, lead or copper or even all three. This occurrence of several metals in one ore deposit will be observed also in the space occupied by ores of the other metals mentioned above.

CASE 1, REAR.—Gold ores, Pacific Coast. These are chiefly quartz or quartz and pyrite. They may be distinguished in general from ores in this class of other localities by a cleaner appearance, the absence of rust and disintegration, and by the smaller proportion of pyrite present.

CASE 2, FRONT.—Gold ores, Colorado. The ores of Cripple Creek, Col., should receive special attention on account of their remarkable richness. Gold, which almost universally occurs free, is in these ores combined with tellurium (a substance related to sulphur) in the form of *telluride ore*. . . .

CASE 2, REAR.—Gold ores, Black Hills, South Dakota. The ores included here are a good example of the great variety of gold ores which may occur in a limited area. Compare, for example, the ore from the Homestake mine with that from the Holy Terror, which again is wholly different from that of the Golden Reward mine. In Hall 79 may be seen ores of yet different characters from this region, some carrying tin, others tungsten, etc.

CASE 3, FRONT.—Gold ores, Great Britain. The collection from the New Morgan Mine, Dolgelly, Wales, is worthy of special attention both on account of its completeness and of the character of the ore. The gold is nearly all free, and much

of it is visible to the eye. Specimens of ore from various parts of the mine are shown, also specimens of the country rock.

CASE 4, FRONT.—Gold ores of the Appalachian Mountains. These gold ores were the first exploited in the United States. They were nearly all abandoned at the time of the discovery of gold in California and have never regained their earlier importance.

In the lower part of this case are gold and silver from Utah.

CASE 3, REAR.—Gold ores, Mexico. They illustrate an unusual occurrence. Those from the Silver Reef consist of sandstone impregnated with argentite and cerargyrite. In one specimen these minerals may be seen replacing organic remains.

CASE B.—Collection of nearly all the known alloys of gold and silver with copper, tin, zinc, lead, arsenic and other metals. Collection illustrating methods of saving gold and silver practiced by Tiffany & Co., New York. Here are shown wash water, concentrates from an exhaust blower that collects the dust of the shops, pieces of flooring of the shops, and shoes worn by workmen, and beside each of these are placed buttons of gold and silver obtained from articles of size similar to those shown.

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## SILVER.

CASE 5, FRONT.—Type specimens of silver-bearing minerals. These are, in the order of their richness: *native, or wire silver*; *argentite*, 87 per cent. silver; *cerargyrite*, 75 per cent. silver; *pyrargyrite*, 65 per cent. silver; *proustite*, 65 per cent. silver; *stephanite*, 68 per cent. silver. *Galena* and *cerussite* may also be regarded as ores of silver, for though they contain but small percentages of silver, they are so abundant as to constitute very important ores. With these should be mentioned, *tetrahedrite*, which may contain as high as 17 per cent. of silver. There are a number of rare silver-bearing minerals.

With each of these minerals is a tube containing the substances of which the mineral is composed in the exact proportions in which they occur in the mineral itself.

CASES 4, REAR, 5 REAR AND 6 REAR.—Silver ores, Nevada. These include ores from the famous Comstock lode.

CASE 5, FRONT AND 6 FRONT.—Silver ores. Mexico. This collection includes examples of both the ores and the rocks in which they occur of the important mining districts in Northern Mexico.

It is especially interesting as showing the association of the ores with eruptive rocks such as are characteristic of most of the richest silver deposits of the world.

CASE 7, FRONT, AND 8, REAR.—Silver-lead ores, New Mexico. The principal ores of this class come from the Magdalena Mountains. They run low in silver, averaging only about 8 oz. per ton, and the percentage of lead is also low. Here may be seen specimens of the "sand carbonate" ore, which crumbles to powder when handled.

CASE 8, FRONT.—Silver-lead ores, Arizona.

CASE 9.—Silver-lead ores, Leadville, Colorado. These ores are similar to those from other Colorado mining districts in the following cases:

CASES 9, 10, 11, 12, 13, AND 14, REAR.—Silver-lead ores, Colorado. These ores are especially abundant in Colorado. They occur in two forms; the sulphide ores, in which the silver is chiefly contained in galena, and the "carbonate" ore, a mixture of cerussite and anglesite. This "carbonate" ore comes from the decomposition of the sulphide ore. Pyrite often accompanies the galena in the sulphide ore. These ores commonly carry gold in small quantities and at times the ore is more valuable for its gold than for its silver.

The following cases contain ores from mining districts which yield both gold and silver, and which may be called gold-silver ores:

CASE 14, FRONT AND 15, FRONT.—Gold and silver ores, Oregon and Washington.

CASES 16 AND 17.—Gold and silver ores, United States of Colombia.

These are from the ancient "El Dorado," or land of gold, from which came the first important yield of gold in the New World, and of which many wonderful stories were circulated.

CASE 18, FRONT.—Lead and silver ores, Great Britain. The specimens illustrate well some of the common associations of galena. Galena is commonly associated with pyrite, but here



we find it mixed with blende, a zinc ore which is very troublesome to the lead smelters. Specimens from the Welsh mines which contain much blende are marked "Poor Ground." A good specimen of fluorite shown here, illustrates another common associate of galena in the English mines, as do also the specimens of calcite and galena. Some of these ores, as for example, that from Snail Beach, are from mines formerly worked by the Romans.

Note the general absence of "carbonates" and the fresh, undecomposed appearance of the specimens. This is also true of the Spanish and German ores. Carbonate and disintegrated ores occur near the surface where air and atmospheric waters have acted and formed them from the sulphides. These mines having been long worked, most of the superficial ores have been removed, so that now only the sulphide ores occurring at great depths are mined.

The gold ores of Great Britain may be found in Case 3, across the hall.

CASES 19, FRONT, AND 20, FRONT.—Lead ores from Germany. Some of the specimens here are especially instructive as showing the characteristic structure of veins. The different minerals are arranged in bands or layers, the metalliferous layers alternating with those of quartz, barite or fluor spar.

CASE 19, REAR.—Silver-lead ores, Greece. Unique among these are the slags of Laurium, which are worked by the Greek Metallurgical Company. The mines of this locality had been operated by the Greeks from the time of Themistocles up to the first century, A. D. Owing to the imperfect methods which they used, however, the slags produced retained appreciable quantities of metal. The modern company, collecting these slags and using them as ores, extracts sufficient lead and silver to yield a good profit.

CASE 20, REAR.—Silver-lead ores, Spain and New South Wales.

CASES D, F, G, H, I AND J.—Illustrate the extraction of gold, silver, lead and copper from their ores. Out of a multitude of processes used, eight of the more typical ones are illustrated. In general, the extraction is carried on by a series of operations. On one side of the case is placed the ore, and lines are drawn from it to specimens of the materials formed

from it by the first operation of extraction. From each of these specimens lines are likewise drawn to specimens of the substances formed from them in subsequent operations, and so on until the final products are shown. It is thus possible for the visitor to follow readily each step of the operation.

CASE D.—Specimens illustrating successive stages in the processes of copper smelting by reverberatory furnace, and by blast furnace. Out of many processes in use two have been selected: 1. The antiquated but classical "Swansea" method, or reverberatory process, as formerly in use in Wales. 2. A modern combination of blast furnace and reverberatory process, as conducted in Omaha, Nebraska. There are a multitude of other processes adapted to different ores and conditions of labor, supplies, etc., but these two illustrate the underlying principles.

CASE F.—The Cyanide process for the extraction of gold from low grade ore as carried out at Mercur, Utah. This process depends upon the solution of the gold from the ore by a dilute solution of cyanide of potassium and precipitation by metallic zinc. The case also contains a collection of concentrates from gold and silver ores, illustrating the process of enriching ores before smelting by the removal of much of the worthless material by mechanical means.

CASE G.—Extraction of gold as practiced at the Argo Smelter, Colorado. This is a type of the processes where the gold is collected in copper by smelting and then isolated by a process of leaching or solution.

CASE H.—Extraction of silver and lead as practiced in the Unterharz, Germany.

By following the labels it will be seen that this apparently complicated process is resolved into the frequent repetition of comparatively few operations.

CASE I.—Extraction of lead and silver by the reverberatory process and by the blast furnace process. These do not represent the process of any particular smelter, but rather are generalized forms of the two most important smelting processes.

CASE J.—Extraction of gold, silver, lead and copper as practiced in the Oberharz, Germany. As with the process illustrated in Case G, the apparent complexity is due to many repetitions of few processes.

The visitor should now pass to the eastern end of the hall and not the following special groups in the center:

K.—Silver, lead and copper ore, Cordillera Hill silver mine, Peelwood, New South Wales.

L.—Gold and silver ore, British Columbia.

M.—Gold ore. A group of large specimens from various localities.

N.—Zinc-lead ore, Laurium, Greece.

O.—Copper-silver ore, Leadville, Colorado.

CASE P.—Group of large specimens of gold ores from American localities:

Q.—Gold-copper-silver ore, Ouray County, Colorado. Assays copper, 28 per cent.; silver, 160 oz. per ton.

R.—Auriferous quartz, San Miguel County, Colorado. Assays average \$6 to \$8 gold per ton.

S.—Gold ore. A group of large specimens of refractory gold ores.

T.—Block of ore from 40 foot level of the Back Creek Silver and Gold Mine, New South Wales. 36 tons yielded 3,406 oz. silver, and gold at the rate of 15 dwt. per ton.

U.—Gold ore, Alma. Park County, Colorado. Assays \$25 per ton.

WALL CASES S, V, and W.—Large specimens of silver and lead ores.

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## HALL 77.

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### West Dome.

Beneath the center of the dome stands a statistical column, giving the bulk of each product of the mines of the United States in 1892, for one second of time. Multiplying this by the number of seconds in a year (31,536,000) will give the annual product. This column was built according to data given by the United States Geological Survey. In the four niches are pyramids of ore, containing: No. 1—Gold and Silver Ores; No. 2—Tin Ores; No. 3—Iron Ores; No. 4—Copper Ores.

The four large specimens surrounding the column are respectively: No. 5—Iron Ore; No. 6—Silver Ore; No. 7—Iron Ore; No. 8—Nickel Ore.

CASES 9 AND 10.—Lead ores. Type specimens of lead-bearing minerals. These are—*galena*, 86 per cent. lead, the most abundant lead mineral and fundamental lead ore; and the following minerals formed from it by oxidation: *Cerussite*, 77 per cent. lead, and *anglesite*, 68 per cent. lead.

There are other minerals which contain lead, but they are not of sufficient abundance to be important as ores. The case contains also lead ores from Illinois, Wisconsin, and Missouri. These contain very little silver, and are mined for lead only.

CASES 11 AND 12.—Silver-lead ores. In appearance these are similar to the silver-free lead ores of cases 9 and 10, from which they differ only in that the lead-bearing minerals also carry silver.

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#### HALL 79.

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### FREDERICK J. V. SKIFF HALL ORES OF THE BASE METALS.

The collections in this hall comprise ores of iron, copper, tin, zinc, nickel, manganese, mercury and antimony, together with various metals and metalloids of minor importance. The ores of each metal are grouped together.

Under each group are placed type specimens of the different ores of the metal arranged in order of their richness. Each of these is accompanied by a group of the materials of which the specimen is composed, so arranged as to show plainly the composition of the specimen. With the type specimens and making up the bulk of the collection specimens of ore from different localities are shown arranged in geographical order. Specimen labels show the mineral of the ore and the amount of metal contained, where this is known. It should be remembered that many of the ores produce more than one metal, in which case the specimen is placed in the group of the predominating metal.

Entering the Hall from the West Dome, the visitor should keep to the left, following along the walls until the starting point is reached, when the large specimens along the center of the Hall may be examined.

## COPPER.

Entering the Hall from the West Dome, the copper ores are to the left. They fill six wall cases and the two adjacent floor cases. The first wall case contains the copper-bearing minerals, arranged in order of their richness; the *native metal*; the red oxide, *cuprite*, 88 per cent. of copper; the black oxide, *tenorite*, 80 per cent., the black sulphide, *chalcocite*, 80 per cent., the blue sulphide, *cocellite*, 66.4 per cent.; the green carbonate, *malachite*, 57 per cent.; the blue carbonate, *azurite*, 55 per cent.; the purple sulphide, *bornite*, 55 per cent.; the gray sulphantimonide, *tetrahedrite*, about 50 per cent.; the bluish green silicate, *chrysocolla*, 36 per cent.; and the brass yellow sulphide, *chalcopyrite*, 34 per cent.

On the lower shelves of this case is a collection of the copper ores of the Appalachian Mountains.

The following wall case contains a collection of native copper and silver and the minerals which are associated with the copper of Northern Michigan. The crystallized copper and the calcites are especially noteworthy.

The two following wall cases, in the northwest corner, contain copper ores from the Western United States, chiefly the Rocky Mountains. The copper ores of this region usually carry gold or silver, and many localities corresponding to a very considerable output of copper ore are represented among the gold ores of Hall 72.

Immediately in front of these cases are two table cases with large specimens of the copper ore from Keweenaw Point, Northern Michigan. In these ores the copper exists as nodules of free metal, which may be seen projecting from the enclosing rock matrix. With these are placed large specimens of Arizona ore of a similar nature.

Returning to the wall cases the visitor may inspect next foreign copper ores contained in two cases.

Those of Great Britain, chiefly from Cornwall and Wales, have been worked from the time of the Phoenicians. Those from Germany, which also represent mines of great antiquity, should be studied in connection with zinc, silver and lead ores from the same mines.

## ZINC.

The six cases along the wall from the last of the copper ores to the entrance to Hall 63 contain the zinc ores, which will be encountered in a geographical order, the reverse of that of the copper ores. That is, the foreign ores come first and the American after. Three immediately adjacent floor cases contain the larger and more choice specimens. With the zinc ores are placed the ores of the allied but little used metal cadmium.

The wall case nearest the copper ores contains foreign zinc ores, of which the most important represented in the collection are the English and Welsh, the Greek and the Spanish. The original black jack of the Welsh miners is here represented and may be profitably compared with the ordinary yellow and brown blendes, which are often miscalled black jack in this country. Immediately in front of this case are two floor cases, one of German zinc-lead ores, which should be studied in connection with the German ores of other metals, shown elsewhere. The other floor case contains choice examples of the zinc ores of Laurium, Greece, which have long been famous for their varieties of color and richness of luster, making them very attractive to the eye. They are chiefly the carbonate, smithsonite.

Additional Spanish zinc ores occupy the bay of another wall case, the upper part of which contains the zinc ores of Arkansas. The great purity and richness of the American zinc ores, as compared with the foreign, is at once apparent, even on casual inspection, and this high quality will be noted in all the succeeding cases which contain American ores. In this case there is a collection of the final, intermediate, and bye-products of the smelting of zinc ores as carried out at LaSalle, Illinois. Following the Arkansas ores are two cases of zinc ores from Missouri, the principal zinc producing state. Included with these are the Kansas ores, which form a continuation of the same deposits.

With the Missouri ores are shown ores from the similar deposits of Wisconsin and Western Illinois. These ores are darker than those of Missouri, owing to the enclosures of bituminous matter. Another visible difference is in the frequent flat or tabular form of the Wisconsin ores and the presence of larger quantities of sulphides of iron. Large specimens of Missouri ores are in an adjacent floor case.

Following the Missouri zinc ores come those of the South-eastern and South-central states. The Virginia and Tennessee ores are not essentially different from those of the ordinary type of zinc ores, while the deposits of South Illinois, Kentucky and New Jersey are decidedly unique.

With the specimens from New Jersey there is a collection of those zinc-bearing minerals which occur in sufficient abundance to be of value as ores.

These are, in the order of their richness: the oxide, *zincite*, 80.3 per cent. of zinc; the sulphide, *sphalerite*, 67 per cent. of zinc; the silicate, *willemite*, 58.5 per cent.; the hydrous silicate, *calamine*, 54.2 per cent., and the carbonate, *smithsonite*, 52 per cent.

The three cases across the entrance to Hall 63, from the zinc ores, contain ores of mercury and various metals and metalloids of lesser importance.

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### MERCURY.

The first case to the right of the entrance contains a series of ores bearing *mercury* and *cinnabar*, with the rocks associated with them, from many localities. Mercury ores from California, Russia, Mexico and the United States of Colombia are shown.

The larger number of specimens represent the well-known Spanish mines. A large iron flask, sealed with a leaden seal, represents the manner of package in which mercury is ordinarily sold.

The following case contains ores of metals and metalloids of minor importance. These include ores of bismuth, molybdenum, uranium, wolfram, chromium and certain rare elements, as caesium, etc.

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### ANTIMONY AND ARSENIC.

The third case from the entrance to Hall 63 contains antimony and arsenic.

Specimens of *stibnite*, the common antimony ore, from various localities in Japan, California, New South Wales, United



States of Colombia and Greece. Nearly all the specimens carry an appreciable percentage of gold.

With the stibnite are examples of the rarer oxidized ores of antimony, *valentinite*, etc.

Ingot antimony and products of smelting stibnite.

Arsenic ores shown here include the sulpharsenide of iron, *leucopyrite*. Much of the arsenic of commerce comes as a by-product from gold or other ores. One such by-product is the arsenical flue dust from treating the silver-lead ores of Laurium, Greece, in which distinct crystals of the oxide or "white arsenic" are plainly visible.

Following the antimony and arsenic ores is a case of ores of nickel, cobalt and aluminum.

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### NICKEL, COBALT AND ALUMINUM.

A series of specimens of nickel and cobalt-bearing minerals is arranged in the order of their richness:

They are:

*Linnaeite*, cobalt sulphide, 58 per cent. cobalt.

*Siegenite*, sulphide of cobalt, nickel and iron, 30 per cent. to 40 per cent. nickel.

*Millerite*, sulphide of nickel, 64.4 per cent. nickel.

*Smaltite*, cobalt and nickel arsenide, cobalt up to 28.2 per cent.

*Chloanthite*, nickel arsenide, up to 28.1 per cent. nickel.

*Cobaltite*, cobalt arseno-sulphide, 35.5 per cent. cobalt.

*Niccolite*, nickel arsenide, 43.9 per cent. nickel.

*Asbolite*, oxide of cobalt, 24 to 40 per cent. cobalt.

*Erythrite*, hydrous cobalt arsenate, 29.5 per cent. cobalt.

*Roselite*, hydrous arsenate of cobalt, lime and magnesia, cobalt, 9.8 per cent.

*Annabergite*, nickel arsenate. Nickel, 29.3 per cent.

*Bieberite*, hydrous cobalt sulphate, cobalt, 20.9 per cent.

*Zaratite*, hydrous nickel carbonate. Nickel, 46.7 per cent.

*Genthite*, hydrous nickel-magnesium silicate. Nickel, 22.6 per cent.

*Garnierite*, hydrous nickel-magnesium silicate. Nickel, variable.

*Pyrrhotite*, with microscopic inclusions of *pentlandite*, sulphide of iron, with sulphide of nickel. Nickel up to 3 per cent.

Other minerals carry cobalt and nickel in small quantities, but are not important as sources of nickel.

A collection of nickel and cobalt ores from all the important deposits of these metals. The most important ores of nickel are two: 1st, the sulphide of iron, *pyrrhotite*, which, in some localities carries minute inclusions of the sulphide of nickel, *pentlandite*, and second, the apple green silicate, *garnierite*.

Nickel and cobalt ores from Canada, New Caledonia and Norway, which are the important producing countries, also nickel and cobalt ores from Oregon, Missouri and other minor localities. In the floor case opposite are larger examples of nickel ores and arsenic ores. This case also contains a series of minerals carrying aluminum in such form and quantity that it may be profitably extracted. These represent the present universal aluminum ore, *beauxite*, and some minerals from which aluminum may be smelted in the near future.

Clay, which is sporadically recommended as an aluminum ore, while it contains much aluminum, sometimes as much as 21 per cent., has the metal present in such form that it cannot be economically extracted and is therefore not included among the ores of this metal. A collection of aluminum ores from all the important deposits of this metal as well as a series illustrating uses of the metal occupy the lower portions of this case.

The following case contains tin ores.

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### TIN.

The common tin ore, is *cassiterite*, or oxide of tin, which carries 78.7 per cent. of tin, and the only other tin carrying mineral of commercial importance, is *stannite*, sulphide of tin, iron and copper, with 17.5 per cent. of the metal.

Tin ore from South Dakota, New South Wales, and Mexico, together with a nearly complete collection of the ores and rocks of the well known tin mines of Cornwall, which have been worked from the beginning of history.

The process of reduction of tin ores to metal is illustrated by specimens from the Redruth Smelting Co., of Cornwall.

Other examples of tin ore may be seen in the West Dome. Following the tin ore is a case of manganese ores.

## MANGANESE.

A collection of minerals carrying manganese in commercially available quantities. These are: 1st. Oxides of manganese, which include, besides several well marked mineral species a number of minerals almost indistinguishable from one another. Of these the most important are: *Pyrolusite*, the binoxide, with 62.4 per cent. manganese.

*Manganite*, the hydrous sesquioxide, with 62.4 per cent. manganese.

*Psilomelane*, another hydrous oxide of manganese, with manganese varying from 50 to 60 per cent.

*Braunite*, the sesquioxide of manganese, with 69.68 per cent. manganese.

*Wad*, which is a mixture of various oxides of manganese with other oxides, and has no definite composition.

Minerals other than the oxides are:

*Rhodochrosite*, the carbonate of manganese, with 47.8 per cent. manganese.

*Rhodonite*, the silicate, with 41.9 per cent. of manganese.

*Franklinite*, an oxide of manganese, zinc and iron, with from 7 per cent. to 23 per cent. manganese.

Ores of manganese from many important mining districts. Especially to be noted are the ores from Santiago de Cuba, which are typical, and those from New Jersey, which are unique in mineralogical character. Polished specimens of rhodonite from England, illustrate an occurrence utilized both as manganese ore and for ornament.

In the two adjacent floor cases are large specimens of manganese ores.

Iron ores fill six wall cases and one floor case.

The case following the manganese ores contains iron ores of South America and Mexico. A full collection of iron ores and surrounding rocks of the Cerro Mercado or Iron Mountain, of Durango, Mexico, illustrates a valuable occurrence of an important but little understood type of iron ore deposit. Large specimens of a specular hematite from the state of Minas Geraes, Brazil, in the lower portion of the case, illustrate the type micaceous hematite, of world-wide distribution. Many of the ores in this case represent deposits of ore almost unknown to the world at large.

## IRON ORES—EUROPE.

Iron Ores, Europe.—The most instructive specimens in this case are a complete collection of the ores and surrounding rocks from two iron ore deposits of Eastern Russia. Better known ores represented here, are those from England and Sweden. Conspicuous among the English ores here illustrated, are the ochres, which are mixtures of limonite or hematite with clay; the soft, bright red hematites which occur in limestone, and the compact spathic ore of the coal measures. German ores show more fibrous hematites and limonites and the well crystallized "sparry" siderite.

Following the foreign ores are three cases of iron ore, from the Lake Superior region.

The ores in these three cases are from the most important iron ore mines of the world. It is to the proximity of these remarkably rich and pure ores that Chicago owes its present importance in the iron and steel industry. The ores are arranged in the cases under the several "ranges" as the iron mining districts around Lake Superior are termed. While similar in many respects, differences between the ores of the several ranges may be noted even in the small specimens here shown.

Specimens of a local magnetic iron sand are worthy of attention as coming from the immediate vicinity of Chicago.

The case following the ores of the Great Lakes region contains Iron Ores, Eastern States.

Iron ores of the Eastern States are here represented largely by limonites and hematites from Virginia and the important Southern districts near Birmingham and Sheffield, Alabama. Magnetic ores from New York, New Jersey, and North Carolina represent another important class of Eastern Ores.

The last wall case contains: Types of Iron Ores. These are: the black oxide, *magnetite*, 72 per cent. iron; the red oxide, *hematite*, 70 per cent. iron; the hydrous oxides, *turgite*, 66 per cent. iron; *gothite*, 64 per cent. iron; *limonite*, 60 per cent. iron; and the carbonate, *siderite*, 48 per cent. iron. These are the mineralogically different ores of iron. Each of these occurs in many forms, giving rise to very numerous sub-classes of iron ores. The more important types which occupy the rest of this case are:

*Magnetites*: Magnetic iron ore. Magnetic iron sand.

*Hematites*: Red hematite, red ochre, specular hematite, micaceous hematite, martite, needle ore, kidney ore.

*Limonites*: Brown hematite, yellow ochre, pipe ore, bomb ore, bog ore.

*Siderites*: Spathic ore, clay iron stone, black band ore.

Opposite the wall cases of iron ores, two floor cases contain larger specimens of various ores of which the magnetic ores and hematites of Sweden are especially noteworthy.

The visitor should now proceed along the center of the hall and examine the large specimens showing the appearance of large masses of ore as actually met with in the mines.

The first specimen is a mass of zinc ore (smithsonite), weighing 5 tons, from Marion Co., Arkansas, showing botryoidal forms not unusual in ores which are like this, of secondary origin.

Passing this, the tall case to the left contains bornite, a copper ore from Griqualand, South Africa. The iridescent tarnish which characterizes this ore is exceptionally well shown in this specimen.

To the right stands another tall case containing a mass of red hematite from the Hart mines, Laramie Co., Wyoming, one of the most largely used of Western iron ores.

Passing these two cases a case standing in the exact center of the Hall is next encountered. This contains a collection of the green and blue copper ores, malachite and azurite, from the Copper Queen Mine of Bisbee, Arizona, a locality which has long been famed for the beauty of its ores.

Beyond this are two cases, of which the one to the left contains a large block of lead-zinc ore from Laurium, Greece, while that to the right contains the green nickel and magnesia silicate, garnierite, the well known nickel ore from New Caledonia.

Passing these, the last specimen, directly opposite the entrance of Hall 63, is a mass of nickel and copper ore weighing six tons, taken from 175 feet below ground in the third level of the Stobie Mine, Sudbury, Ontario.

## HALL 78.

**SALTS OF THE ALKALIES AND ALKALINE EARTHS.**

These include besides salt and similar compounds such minerals as asbestos and mica. Here belong also the borates, phosphates, etc., which occur in nature chiefly in combination with lime or soda. Besides the alkali and alkali earth compounds, sulphur and abrasives may be found in this hall as well as various useful minerals of special or limited use.

CASE 1.—An unusually large and complete display of the “Stassfurt Salts.” These salts are rich in potash and magnesia, and furnish nearly the whole of the world’s supply of potash.

CASE 2.—Applications of potash salts. A collection of the compounds of potash used in the arts.

CASE 3.—Soda salts.

The most important mineral in this class is salt, many varieties of which are shown. Cryolite and its uses. The process of making soda and alumina from cryolite is fully illustrated.

CASE 4.—Lime and Magnesia salts. These include gypsum, dolomite and magnesite. Applications of gypsum are included here. Barium and Strontium salts, including chiefly barite and celestite, compounds of strontia and baryta, alkaline earths allied to lime.

CASE 5.—Gypsum. This is a hydrated sulphate of lime from which plaster-of-paris and the fertilizer land-plaster are made.

CASE 6.—Borates. The minerals from which borax is obtained and their products.

CASES 7 AND 8.—Phosphates.

Minerals and rock phosphates from well-known localities in England, Spain, Canada, Carolina, Tennessee, and Florida. Guano from Venezuela and Santiago de Cuba.

PLATFORM 14.—A large specimen of apatite from Canada. This should be studied in conjunction with the phosphate collections of cases 7 and 8.

CASE 9.—Sulphur. Besides native sulphur from many localities, examples are given of the more important metallic compounds from which sulphur is obtained in commercial quantities. The various forms in which sulphur comes to the market are illustrated.

CASE 10.—Asbestos. These specimens are of asbestos as mined and are not confined to the commercially valuable material but include also many specimens of grades which at present are of little economic importance. Consequently all stages between a merely compact but somewhat columnar tremolite and the finely fibrous flexible asbestos of the best quality may be traced through these specimens.

CASE 11.—Mica. Besides the thin plates of mica of the best quality from leading American and Russian quarries, specimens of low grade material enable the visitor to note the difference between the ordinary micas and the more valuable kinds.

The rocks in which the mica occurs are also shown.

CASES 12 AND 13.—Abrasives. Corundum, emery, garnet, sand and pumice stone are the more important minerals of this case. Other useful abrasives are represented by obsidian and feldspar. The rocks and minerals associated with emery are characteristic and should be examined in connection with the emery itself. The great variety in mineralogical composition of the abrasives should be noted. Carborundum and crushed steel represent the class of artificial abrasives.

PLATFORM NO. 16.—Large specimens of gypsum and fluor spar. Large specimens of rock salt and epsomite or natural epsom salts. Large specimens of natural sulphate of soda (*Glauber's salt*). Salt from Stassfurt, Prussia.

CASE 15.—Applications of asbestos.

CASE 17.—The Leblanc process for the manufacture of soda. All stages of the process are illustrated by specimens of the raw, intermediate and final products. The relations of the various products to each other are indicated by the connecting lines.

CASE 18.—The ammonia process for the manufacture of soda. This process is fully illustrated by a series of the raw materials, intermediate and final products being so arranged that the process may be followed step by step. The electrolytic process for the manufacture of soda is illustrated in the same manner.



### HALLS 73, 74 AND 75.

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HALL 73.—Palaeontological laboratory of the Department of Geology.

HALL 74.—Office and library of the Department of Geology. The works in the library treat of geology and kindred subjects, and are intended primarily for the use of officers of the Department. On application to the Curator, however, opportunity will be given to visitors to consult any special work.

HALL 75.—Chemical and Petrographical laboratory of the Department of Geology.

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## DEPARTMENT OF BOTANY AND PLANT ECONOMICS.

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This department occupies the galleries of the North, South, East (in part) and West Courts of the main building, and may be reached by any of the four flights of stairs near the central rotunda, or by the stairways at either side of the east and west main doors.

The department is now being reinstalled. The old geographic arrangement, established in the beginning, is being replaced as rapidly as possible by a consecutive systematic series. New cases are being constructed and installed ready to shift into their natural places so soon as a sufficient number are complete. The following elements for the new arrangement will be found upon the transept galleries surrounding the central dome of the building.

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### THE EAST TRANSEPT.

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#### THE LINACEAE.

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Seven cases devoted to flax, (*Linum usitatissimum*), and the various utilizations of both its fiber and seed in the manufacture of linen cloth, thread and paper, and linseed oil and oil-cake.

CASE 1.—Contains specimens of flax straw, hackled flax, and flax tow from the chief flax growing regions of the world.

CASE 4.—An old hand flax-brake and two bromide enlargements, showing the method of using this machine.

CASE 5.—A homespun loom, built in 1802, used in the early part of the last century for weaving such fabrics as are shown in Case 9.

CASE 6.—Two spinning wheels. The larger, which is known to be over 116 years old, was run by hand power and illustrates the older method of spinning with the aid of the distaff. The smaller one is a more modern foot power wheel.

CASE 7.—The table part of this case contains a monographic series of specimens descriptive of the process of securing linen yarns from flax straw. The upright portion is devoted to photographs illustrating the old and the new method of producing linen.

CASE 8.—Specimens of the principal kinds of linen thread of Irish and American manufacture. A series of specimens illustrating the manufacture of linseed oil and oil-cake from the flax seed. Specimens showing the various types of linen cloths and laces.

CASE 9.—American Homespun. Specimens illustrating the home manufacture of linen cloth and thread.

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## THE PALMAE.

The passage from the East to the North court contains four wall-cases devoted to the economic products of the Palm family.

CASE 10.—Coir Ship's Cable, 300 feet long, 4 inches thick at one end and  $\frac{5}{8}$  at the other. Made from the fiber of the coconut husk.

CASE 11.—Installation illustrating the various products made from the fiber of the Saw Palmetto (*Sabal serrulata*), and the processes of obtaining them.

CASE 12.—Specimens illustrating the utilization of the coconut (*Cocos nucifera*), including a wax model of the fruit in cross section, also specimens of coconut oil, soap, meat, meal, milk, copra, coconut, sugar, butter, wine, etc. Photograph of the

Cabbage Palmetto (*Sabal palmetto*); and specimens exemplifying the utilization of the leaves, and of the fiber obtained from the base of the leaves.

CASE 13.—Contains photograph of the coconut palm (*Cocos nucifera*), and specimens of its wood (called porcupine wood), fruit, husk, leaf, leaf sheath, midrib, etc., and also of various samples of coarse textiles, cordage, and the like, made from coir.

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## THE NORTH TRANSEPT.

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### THE PINACEAE.

The installation on this transept exemplifies the economic products derived from the various members of the Pine family (*Pinaceae*).

CASE 14.—This case contains specimens illustrating the use of the needles of the Georgia Pine (*Pinus palustris*), for obtaining oil, tanning liquor, and also fiber which is used in making cordage, coarse textiles, surgical dressing, etc., samples of which are shown.

CASES 15 AND 16.—These cases contain the commercial products derived by distillation and otherwise from the various resin-yielding species of pine, including specimens of crude and refined turpentine, resin or colophony, pek, various rosins, pitch, tar, tar oil, Matsu charcoal, etc.

CASE 17.—Turpentine Orcharding. Specimens of the Georgia Pine (*Pinus palustris*), showing the method of tapping for turpentine.

CASE 18.—Specimens of various household utensils, etc., made from the wood-pulp fiber of various members of the Pine family. Spruce is the wood principally employed.

CASES 19 AND 20.—Installation illustrating the various steps in the process of manufacturing paper from spruce wood, also sulphite and ground wood pulp.

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### THE GRAMINAE.

The passageway leading from the North to the West Transept contains five cases devoted to the various phases of Indian Corn or Maize (*Zea Mays*).

CASE 22.—A series of the numerous agricultural varieties of Indian corn, including specimens of the various pod, sweet, dent, flint, starch, and popcorns.

CASE 23.—Official standards of corn. At most of the large railroad and grain shipping centers of this country official gradings have been established by Corn Exchanges, State Commissions, Boards of Trade or other authorized bodies. This installation shows the various grades of a number of the more important localities.

The right side of this case contains a geographic installation of corn from the various corn growing countries of the world.

CASE 24.—A natural size wax model of a corn plant showing its ordinary cultural habit.

CASE 25.—Illustrating the history of Indian corn. Hybrid varieties of maize of high coloring grown by various Indian tribes for use as food and in religious ceremonials. Various aboriginal corn foods from Mexico, Central and South America, and photographs showing the methods of preparation.

CASE 26.—This case is devoted to specimens of the various modern cereal food preparations made from corn, the manufacture of whiskey, and to some extent the numerous utilizations of the cob, husk, pith, stalk, etc.

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## THE WEST TRANSCRIPT.

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The cases on this floor are devoted to the following exhibits: 3 cases to the cotton plant and its utilization; 2 cases to plant dissemination; 2 cases to peculiar foods; 2 cases to gums and rubbers; and one case to the bean family (*Leguminosae*).

CASE 27.—This case contains a geographic collection of cottons; specimens illustrating the utilization of the cotton fiber in the manufacture of celluloid, etc., and a series of cotton oils with samples of economic products made therefrom.

CASE 28.—In the upright portion of this case are shown bromide enlargements of a cotton field, gin, and transport, while the table part is devoted to specimens of all the products and by-products arising in the separation of the cotton from the seed, and in the extraction of cotton seed oil.

CASE 29.—Types of cotton cloths and laces. Monographic series illustrating the manufacture of absorbent cotton, and cotton thread.

CASES 30 AND 31.—How plants travel. Illustrating the most characteristic methods by which seed dissemination is accomplished.

CASES 32 AND 33.—Peculiar foods. Including specimens of numerous aboriginal and native foods and food preparations.

The upright portion of these cases also contain a number of interesting specimens of curious wood forms.

CASE 34.—A varied and interesting collection of vegetable gums, the uses of which obtain largely in medicine and the arts.

CASE 35.—Specimens of gums, rubbers, and gutta percha from Mexico, Central and South America, Yucatan and Johore.

CASE 36.—A geographic installment of nearly all of the more important edible and horticultural varieties of the common bean. See also cases 45 and 46 for other specimens of the Bean family (*Leguminosae*).

The passageway from the West to the South Transept is installed as follows: one case is devoted to the Madder family (*Rubiaceae*); one-half case to the Tea family (*Theaceae*); one-half case to the Holly family (*Ilicineae*); two cases to the Oak family (*Fagaceae*); one-half case to the Laurels (*Lauraceae*); and one-half case to the Sumachs (*Anacardiaceae*).

CASE 37.—This case is devoted to coffee (*Coffea Arabica*), its harvesting, varieties, geographic distribution, preparation, standards, extracts, substitutes, and adulterants.

CASE 38.—One-half of this case is devoted to the various grades of Japan tea (*Thea Chinesis*), and the other to maté or Yerba, the so-called Paraguay tea (*Ilex Paraguensis*).

CASE 39.—The Cork Oak. A very fine and costly decortication of a young tree with three branches. This specimen is considered one of the best examples of dextrous cork peeling ever produced.

CASE 40.—The utilization of the cork oak in the manufacture of corks, linoleum, packing paper, life preservers, insulators, etc.

CASE 41.—One-half of this case is devoted to the Laurel family (*Lauraceae*), and its economic products, as camphor, cinnamon and Cassia oil and bark, etc. Also an interesting

Japanese water-color painting showing the method of distilling camphor.

The other half contains specimens of some of the more important products of the *Anacardiaceae*, including illustrations and products of the Japanese lacquer tree (*Rhus vernicifera*), a piece of lacquer work, vegetable waxes, gums, oils, etc., and models of the Cashew and other *Anacardiaceous* fruits.

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## THE SOUTH TRANSEPT.

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The cases on this transept are in course of installation with the product of various families of greater economic importance, those completed include two cases of grasses (*Gramineae*), two of the Bean family (*Leguminosae*), and one of the Amarylls (*Amaryllidaceae*).

CASE 42.—This case contains a general geographic collection of grass seeds, a series of cane sugar specimens and a very instructive collection of the chief cereals and cereal products.

CASE 44.—Various specimens of bamboo as cultivated in Japan.

Originally no bamboos grew on the islands of the Japanese archipelago, where they are now cultivated to a large extent, and rendered by husbandry processes, very straight, firm and useful. The red and brown colorations, spots, ridges, blotches, and other beautifying marks upon these bamboos are also the result of careful and studied cultivation of various fungi parasitic upon them.

CASES 45 AND 46.—The Bean family (*Leguminosae*). (See also Case 36). Two cases exemplifying the products of this large and very important family. The exhibit includes various specimens of edible and ornamental beans, peas, lupines, vetches, lentils, clovers, medicagos, licorice, peanuts, acacia, and many others, together with oils, gums, resins, tan barks, indigo, starch, fibers, etc., obtained from various members of this group.

CASE 49.—The Amarylls (*Amaryllidaceae*). Photographs and specimens of various Agaves together with numerous examples of products manufactured from them and descriptions of the processes of preparation.

CASE 51.—The Mulberry Family (*Moraceae*). This case is devoted to the various products of this group which includes hemp, hops, Central American rubber (*Castilloa elastica*), India rubber (*Ficus elastica*), figs, paper mulberry fibre, fustic dye, the bread-fruit, mulberries, etc.

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## OLD INSTALLATION.

In the old installation which is now being drawn upon in the installation of the new cases the general arrangement is as nearly geographic in character as is possible. Beginning at the northeast corner of the South Court the visitor travels westward through Russia, Corea, Japan, India, Ceylon, Johore, Turkey, Spain and Australia; thence, beginning at the Straits of Magellan, northward through Argentine, Paraguay, Brazil, Venezuela, Trinidad, British Guiana, Ecuador, Columbia, Guatemala, and Mexico, to the United States.

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## RUSSIA.

CASE 3.—Russian Tobacco. The first tier in this case comprises the original natural species (*Nicotiana rustica*), from which most of the finer cultivated forms have sprung. The balance of the specimens are of the variety known as Turkish leaf, cultivated in different sections of the country.

CASE 3A.—Russian Flax. In this case may be found excellent specimens of dressed and undressed flax, together with the plants from which this useful fiber is obtained.

CASE 3B.—Lime Tree Products. Probably the most useful tree to the Russian peasant is the Lime or Linden (*Tilia parviflora*), from the best layers of which many households gain the major portion of their useful appurtenances, even the structure of the dwelling itself, its floor covering and its furniture. Among the specimens will be found the natural bark, the inner layers, the fiber, both crude and macerated, matting, bags, ropes, harness, shoes, trunks, etc.

EAST WALL.—On the east wall platforms extending through this section will be found the principal commercial timbers of Russia, both in log and plank.

CASES 4, 5, 6, 7, 8, 9 AND 10.—These cases contain the cereals and legumes of Russia.



This is probably as complete a collection of the species and varieties of the agricultural seeds of that country as can be found in any Museum in the world.

### COREA.

CASES 11A AND 11B.—A collection of the woods, cereals, nuts, and dried fruits of this peninsula.

A comparison of the woods of this country with those of Japan, will prove interesting.

### JAPAN.

CASES 11C, 11D, AND 11E.—The fibers and tobaccos of Japan.

CASE 12.—Specimens of insects injurious to useful plants of Japan.

This beautiful and highly scientific collection showing the successive phases of insect development, as well as the injury caused by them to the plants upon which they feed, was prepared for exhibit in the Japanese section at the Exposition, but on account of lack of space was not unpacked.

CASES 13A, 13B, AND 13C.—The construction timbers of Japan.

This set of specimens is particularly interesting to the student, as each wood is accompanied by a portion of the bark, and by illustrations of the foliage and fruit.

WALL.—Among the specimens here exhibited is a comprehensive series of the commercial timbers of the country in plank, square, bark, and panel. Each species is accompanied by an illustration of the foliage characteristics similar to those in connection with the construction timbers. Many specimens representing their utilization may be seen. At the south end are three native paintings showing timber operations in Japan; these are particularly interesting on account of their similarity to those carried on in this country.

CASES 15A, 15B, AND 15C.—The Cabinet Woods of Japan.

CASE 16.—Minor Forest Products: Starches, Pyroligneous Acid, Fossil Boards, and Charcoal, accompanied by explanatory labels and water-color drawings.

CASES 17A, 17B, AND 17C.—Minor Forest Products: Edible Mushrooms, and Waxes.

CASE 18.—Standard of Toko Posts.

The *Toko* is the ornamental place of honor in the Japanese parlor. It is here that ceremonial tea is served. This place is dear to the heart of the Japanese hostess, and is generally furnished in the height of Japanese neatness and artistic taste. These posts are placed to support a canopy overhead, and are always of some natural unhewn wood, often decorticated, or partially so. The woods chosen for *toko* posts are generally those of high commercial value and especial rarity.

CASES 19A, 19B, 19C.—Grains and Minor Forest Products.

In this case will be found most of the species of tan barks, dyes and fibrous barks.

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### BRITISH INDIA.

CASES 20, 20A, AND 20B.—The Fibers and Minor Forest Products of India.

WALL.—The wall of this section is wainscoated with various species of the commercial timbers of the country, in the center of which is a beautiful *padouk* doorway, and carved blackwood stands for jardinières. Along this wall may also be seen blocks of Teakwood, famous as ship building material.

STAND 22.—A single circular piece of *padouk* board, six feet eight inches in diameter, suitable for a table top.

STANDS 23 AND 23A.—Logs of Commercial Woods.

Notable among these are satin-wood and sandal-wood. Photographs of teak plantations and the catch industry.

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### CEYLON.

CASES 24A AND 24B.—The Commercial Woods of Ceylon.

This case also contains many Ceylon products, both of forest and field. Starches, oils, gums, etc.

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### JOHORE.

CASES 24C, 24D, 24E, 24F, 24 G, AND 24H.—The woods of Johore, commercial and non-commercial, together with the minor forest products of the country.

Notable in this case is anatto seed, oil and paste, so extensively used in the United States in the coloration of butter and cheese.

CASE 15.—The Rattans and Medicinal Plants of Johore.

STANDARD 25A.—The Commercial Rattans of Johore.

## **TURKEY.**

CASE 17.—The woods of Turkey. Even the casual observer will note here the striking resemblance between these woods and those of our own country; particularly is this true of the pine, cedar, oak, ash, cherry, and sycamore.

## **SPAIN AND CUBA.**

CASE 17A.—The Woods of Cuba, principally cultivated species.

CASE 18.—Economic Plant Products. Especially interesting is the large comparative collection of olive oils, representing the products of various provinces and years.

## **LIBERIA.**

CASE 28A.—Minor Forest Products, Oils, Calabar Beans, etc.

## **NEW SOUTH WALES.**

WALL AND STANDARD 29 AND 29A.—The principal timbers of the country, exhibiting excellent specimens of their cedar, rosewood, beech, and several species of Eucalyptus or gum.

Tan Barks and Paving Blocks of New South Wales.

## **SOUTH SEA ISLANDS.**

CASE 30.—Sea Fruits.

This designation is given to various odd and curiously shaped fruits cast by the waves upon the beaches of the Pacific

Islands, where they are gathered principally by sailors attached to whaling vessels. The most notable among these fruits is the "Coca de Mer," the largest known tree fruit, curious both on account of its shape and size.

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### PARAGUAY.

CASE 30A.—*Mate* or *Yerba*. Paraguay Tea.

The source of *Mate*, the principal drink of South America, is the roasted and powdered younger leaves and twigs of a forest tree belonging to the Holly family.

The beverage is prepared in the same manner as tea is "drawn," and is drunk in hot infusion. Great care is taken, however, to thoroughly strain the liquor, in order that no portion of the powder shall be swallowed. Properly prepared *Mate* forms a pleasant and slightly stimulating morning drink, which may be taken clear, or with sugar or milk, or both.

PLATFORMS.—Upon the platforms of the three Sections devoted to this country may be found an excellent collection of its principal timbers, the largest and most complete in existence; notable species are *Lignum Vitae*, *Incense Cedar*, *Quebracho*, and a particularly fine specimen of *Orange Mulberry*.

A complete collection of dyeing and tanning barks, fiber plants, charcoals, and curious llanos may be seen upon the shelves and walls.

CASES 31 AND 31A.—Medicinal Plants of Paraguay.

CASES 31B AND 31C.—Fiber Plants. This collection is particularly rich in *Bromeliads*.

CASES 32 AND 32A.—Economic and Medicinal Plants.

CASE 34.—Paraguayan Seeds. Cereals, and Oils.

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### BRAZIL.

CASE 34A.—The Woods of Santa Catharina and Espiritu Santo.

Though the specimens in these collections are small, they represent a very complete and highly valuable series, and are especially useful for study, and comparison with the other states of Brazil.

## WALLS AND CENTER-PIECE.—Commercial Woods of Brazil.

The color forms of the Brazilian "Pine" (*Araucaria*) here exhibited compare well with the useful forms of *Cryptomeria* of Japan—forms, it is true, that are due to diseased conditions, but highly ornamental and useful. The beautiful *Pao Amaillo* cannot fail to attract and please. This species will doubtless be largely exported in the future, as it has attracted very favorable notice here.

CASE 35.—The Woods of Pernambuco.

CASE 35A.—Woods of Ceara.

WALL.—The Woods of Parana.

This set is one of the most complete and uniform wood collections sent here from Brazil, and represents a large outlay of time and money.

CASES 36 AND 36A.—Bast Fibers.

Notable in this case is the wonderful "natural oakum," a bast that requires but slight preparation to fit it for the calking iron.

WEST WALL.—The Woods of Minas Geraes and Para.

A large and valuable set of trunk specimens, notable among which are rosewood, snakewood, violet, and the indispensable Brazilian cedar.

CASES 37 AND 37A.—Medicinal Plants.

Brazil is especially rich in medicinal plants. It is from this country that many of our most useful plant medicines are derived; notably, sarsaparilla and copaiva.

CASES 38 AND 38A.—Rubber.

The principal product of Brazil, next to coffee and sugar, is the so-called India Rubber, for which the Amazon and its tributaries are famous. Seventy-five per cent. of the product is exported to the United States. Nearly all forms of the raw material may be seen in the collection.

CASES 39 AND 39A.—Medicinal Plants, and Oils.

CASES 40 AND 40A.—Textile Fibers.

This collection is particularly rich in Palm Products.

CASES 41 AND 41A.—Gums, Resins, Seeds, and Cereals.

NORTH WALL.—The Woods of Maranhao.

### ECUADOR.

CASES 42 AND 42A.—Ecuador Products.

CASE 43.—Seeds, Gums and Medicinal Plants.

Two cases containing specimen woods of Ecuador may be found on the transept of the North Gallery.

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### COLUMBIA.

CASE 43A.—Minor Forest Products.

WALL.—A series of Colombian Woods.

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### VENEZUELA.

WALL.—Woods.

This collection, though composed mostly of small specimens, is particularly valuable in that nearly all of the species are authentically identified. It is also a quite complete series, and one of great scientific value.

CASE 44.—Fibers, Cottons, Cereals, and Barks.

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### BRITISH GUIANA.

CASE 44A.—Gums, Oils, Starches, and *Cassava* bread.

WALL.—The Woods of British Guiana.

This collection contains many richly colored and valuable timbers, among which the *wallaba*, green heart, purple heart, and mahogany are especially deserving of careful comparison with the cabinet timbers of any country.

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### TRINIDAD.

WALL.—The Woods of Trinidad excited the most favorable notice of any displayed at the Exposition, both for their beautiful markings, and high permanent color. The magnificent *Saman*, or leopard mahogany, was by far the finest specimen in the Forestry Building, while the *angelin* and purple heart were wonderful examples of high color in wood. This collection forms one of the brightest color spots in the galleries.

## CURACAO.

CASE 47.—Economic Plants, Fruits and Woods.

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## GUATEMALA.

CASE 47A.—Cereals, and Legumes.

WALL.—The Woods of Guatemala.

CASES 47B AND 47C.—Fibers and Cottons.

CASE 48.—Guatemalan Forest Products.

CASE 48A.—Cereals, Legumes, Gums, and Resins, *Chicle* from the juice of the *sapote* tree, the base of most modern chewing gums, may be seen here and in Case 52.

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## JAMAICA.

This collection is particularly rich in Starches—Arrow-root, Mandioca, and Banana meal being excellently represented.

WALL.—The Woods of Jamaica.

An excellent and very complete collection of the principal woods of the island.

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## MEXICO

CASES 50 AND 51A.—Mexican Seeds, Cereals, Gums and Oils.

WALL.—This space is designed for the Timbers of Mexico, of which the Museum secured a large and complete set, now in preparation for installation.

CASES 52 AND 53A.—Mexican Textiles.

CASES 54 AND 55A.—Medicinal Plants of Mexico.

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## GALLERIES OF THE NORTH COURT.

### ECONOMIC PLANTS.

CASES 55 TO 59A.—Tobacco. These cases contain nearly four hundred samples of American grown tobaccos, from almost every producing district of the United States. A very complete and highly important comparative collection, both from the standpoint of the student and of the merchant.



### COTTONS.

- CASE 60.—Texas and Arkansas cottons.  
 CASE 60A.—Arkansas and Tennessee cottons.  
 CASE 61.—Mississippi and Louisiana cottons.  
 CASE 61A.—Louisiana and Texas cottons.  
 CASE 62.—Virginia and North Carolina cottons.  
 CASE 62A.—Georgia and South Carolina cottons.  
 CASE 63.—Georgia cottons.  
 CASE 63A.—Alabama and Mississippi cottons.  
 CASE 64.—Georgia, Florida, Oklahoma, Tennessee and Missouri cottons.
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### FIBERS.

- CASE 65A.—*Abutilon*, Okra, *Asclepias*, and Indian Hemp.  
 CASE 66.—Manila Hemp, Ixtle and *Yucca*.  
 CASE 68.—Florida Sisal.  
 CASE 69A.—New Zealand Flax.  
 CASE 69B.—Louisiana Cane Fiber.  
 CASE 71A.—Ramie Yarns, natural and dyed.
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### SYLVA OF THE UNITED STATES.

WEST WALL.—A nearly complete collection of the Leaves, Fruits, and Woods of the trees of our country, accompanied by graphic maps showing the distribution of each species. This fine collection is arranged systematically, and affords an excellent opportunity for comparison between allied woods. The richness of our sylva in oaks and conifers is strikingly exemplified.

CASES 74 TO 78A.—A set of twenty monographs of North American trees. Each species in this set is illustrated by a large distribution map; photo-micrographs of three sections of the wood, horizontal, tangential, and radial; a branch in full leaf and fruit; microscopic sections of the wood in three planes, and a section of trunk showing the bark.

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### GALLERIES OF THE EAST COURT.

CASES 81 AND 83.—Timber tests. Standards representing the results of strain upon various species of American timbers.

## MONOGRAPHS OF AMERICAN TIMBER TREES.

The wall spaces between cases 81 and 86 are in process of installation with groups representing the various more commercial timbers of North America. These monographic groups are being finished as rapidly as proper curing of the specimens will permit. The scheme is to represent each species by the following grouped specimens:

1. A branch from the tree, in leaf, with the flowers and fruits, and an authentic piece of wood *from the individual furnishing the branch*
2. A photograph of the tree in summer, showing its general form and character of growth.
3. A photograph of the identical tree in winter, showing its method of branching and general winter aspect.
4. A trunk section showing the bark and form characters, these trunks to be uniformly one-half the average size attained by the species.
5. A cross section of the same trunk, showing the character of the annual growth.
6. A detail map of North America, upon which the range of the species is depicted in three grades of color, showing the principal, general, and limital extension of the timber.
7. A descriptive label, giving the characters and utilization of the species.
8. A large plank, plain sawed, showing the objective commercial character of the lumber.
9. Various fancy boards showing the cabinet forms of the species.

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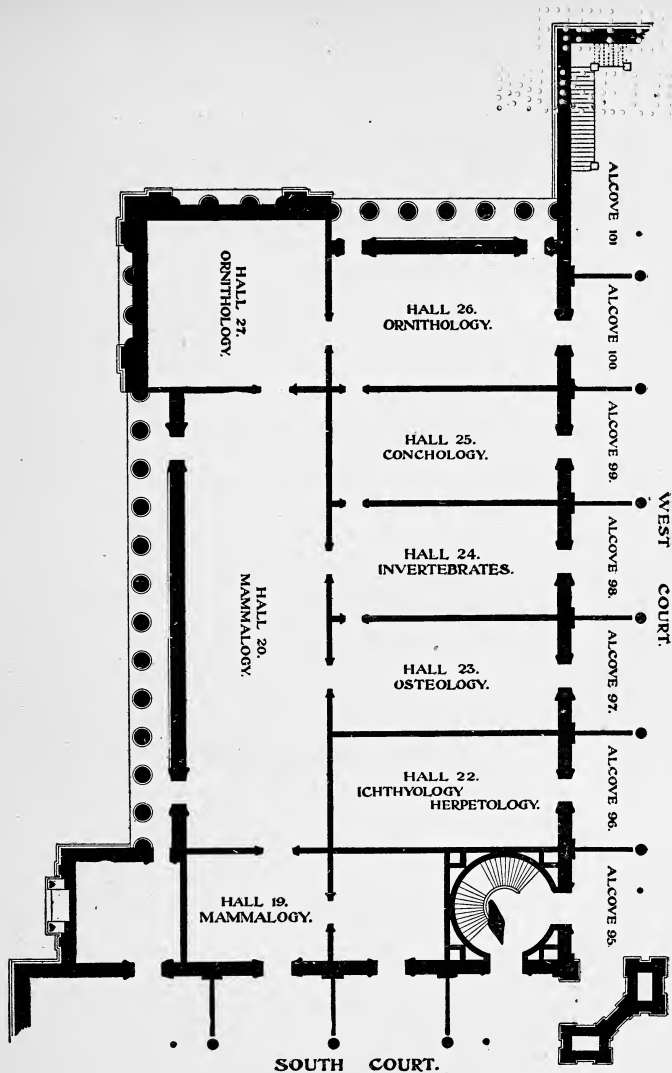
## ILLINOIS WOODS.

Beyond this, and continuing to the end of the gallery, is arranged in natural order, a very complete series of the timber trees of Illinois.

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## THE HERBARIUM.

The herbarium of this department is located in the north balcony over the main entrance to the Museum, and is open at all times, during business hours, to students of systematic phytology and ecology. The collections are large and particularly rich in the flora of North America, the West Indies and Mexico, and the genera *Salix*, *Euphorbia*, *Juncus* and *Carex*, with a generous amount of species of Europe, Asia, and Africa.



PLAN OF DEPARTMENTS OF  
ZOOLOGY AND ORNITHOLOGY.

## DEPARTMENT OF ZOOLOGY.

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The collections in Zoology occupy Halls 19, 20, 22, 23, 24, 25, 26, 27, the West Court and its Alcoves on South Side, and the South Court and its Alcoves on the West Side. Of these halls and alcoves, the Department of Ornithology occupies Halls 26 and 27., and Alcove 100. The collections found there are described elsewhere.

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### WEST COURT.

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Excepting the group of Musk Ox, it is intended that this court shall be filled with groups of large mammals collected by the Museum's East African Expedition, in 1896. The few cases now in this court, and not belonging to this collection, will sooner or later be replaced by those whose positions they occupy. These groups were all mounted by Mr. C. E. Akeley, the chief taxidermist of the Museum. In the middle of the east end of this court is suspended from the roof of the building the skeleton of a North Atlantic right whale (*Balaena biscayensis*). This skeleton has a length of 44½ feet.

In the middle of the east end is a group of Musk Ox. (For a description of this and other groups in the west and South Courts see labels in each case).

In the alcove at the west end of the court are three cases: one contains a Pacific Walrus, one Llamas, Alpaca and Vicugna, and one contains a group of Pumas.

Beginning at the east end of this court and extending along the north side is a row of large cases, the contents of which are as follows:

A group of Cheetah, or Hunting Leopard, Somaliland, East Africa.

A group of Dibatag, East Africa.

A group of Beisa Antelope, East Africa.

A group of Zebra, Transvaal, S. Africa.

A group of Swayne's Hartbeest, East Africa.

A group of Orangutans, Borneo.

A group of striped Hyæna, East Africa.

The case at the west end of the court contains a group of the Big Koodoo, East Africa.

Following from the west to the east end on the south side of this court is a second row of large cases, the contents of which are:

A group of spotted Hyaena, Somaliland, East Africa.

A group of Proboscis Monkeys, Borneo.

A group of Somaliland Wild Ass, East Africa.

A group of the Lesser Koodoo, Somaliland and Ogaden, East Africa.

A group of Waller's Gazelle, Somaliland, East Africa.

A group of Northern Wart Hog, East Africa.

### ALCOVES WEST COURT

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ALCOVE 95.—Male Elephant and young.

ALCOVE 96.—Loggerhead Turtle and Leatherback Turtle; jaws of Bottle Nosed and Sperm Whales.

ALCOVE 97.—See page 96.

ALCOVE 98.—Rhinoceros; Guar Ox; models of Grampus, Porpoises, etc.

ALCOVE 99.—Mounted male Wapiti and Giraffe.

ALCOVE 100.—See page 99.

### SOUTH COURT

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In the center of this court are four groups of American Deer, representing the animals in the four seasons. The case at the north end contains a group of Mountain Sheep, and that at the south end contains a group of Polar Bear.

The case in the South Alcove of the west side, contains five Seals and a Sea Elephant from the Kerguelen Islands; that in the North Alcove of the west side contains a male, female and young of the Northern Fur Seal, and a Steller's Sea Lion from the Pacific Coast.

Under the North Gallery and along the sides of this court are arranged table cases, numbers one to sixteen containing shells. The remaining cases containing shells of this set, are in room 25, for an account of which see Page 13.

## COLLECTION OF MOLLUSKS.

The collection of Mollusca contains 7,000 species or more. It is believed to represent fairly well the subject of conchology. The collection is shown in 32 table cases, one to 16 being in the South Court, seventeen to 32 in Hall 25. In the arrangement of the families Dr. Paul Fischer's classification has been followed in its reverse order.

CASE 1.—This case contains a small collection of Brachiopoda; these are not Mollusca though in external form they resemble the Lamellibranchiate shells. The Brachiopods were very numerous in earlier geological times. The Mollusca proper follow the Brachiopods in Case 1, the important families represented are the *Anatinidae*, *Pandoridae*, *Tellinidae* and the *Teridinidae* (Ship Worms), Piddocks, etc. Also examples of injury done submerged wood by the ship worms; *Pholadidae* (Burrowing Shells); *Myidae* (Soft shelled Clams).

CASE 2.—*Solenidae* (Razor Shells); *Psammobiidae*; *Donicidae* (Wedge Shells).

CASE 3.—*Veneridae*, a very large family which contains many beautiful shells; *Chamidae*.

CASE 4.—*Cardiidae* (Cockle shells); *Tridacnidae* (Giant Clams); two very large examples of this family can be seen in Hall 25.

CASE 5.—*Unionidae* (River Mussels).

CASE 6.—*Unionidae* continued.

CASE 7.—In this case is represented a collection of pearl-bearing shells from Wisconsin, also a number of pearls. It contains also representatives of the *Arcidae* (Ark shells).

CASE 8.—*Mytilidae* (Mussels); *Aviculidae* (Wing Shells), this family includes among other species the "Pearl Oyster," of which specimens are here shown.

CASE 9. — *Pectinidae* (Scallop Shells); *Spondylidae* (Thorny oysters); these two families contain many shells which are interesting on account of their forms and their brilliant colors.

CASE 10.—*Ostreidae* (Oysters); *Dentaliidae* (tooth-shells); *Chitonidae* (Chitons); *Patellidae* (Limpet Shells); *Fissurellidae* (Keyhole Limpets).

CASE 11.—*Haliotidae* (Ear Shells, Ablone).

CASE 12.—*Turbinidae* (Top Shells); *Neritidae*; *Naticidae*; *Xenophoridae*.

CASE 13.—*Capulidae* (Cup and Saucer Limpets); *Ampullariidae* (Apple Snails); *Littorinidae* (Periwinkles).

CASE 14.—*Melanidae*; *Turritellidae*; *Vermetidae* (worm shells, the shells being more or less contorted like worm tubes); *Cerithidae*.

CASE 15.—*Strombidae* (Conch Shells); *Cypraeidae* (Cowries), a family containing some of the most beautiful shells known.

CASE 16.—*Doliidae* (Tun Shells); *Cassidae* (Helmet Shells).

CASE 17.—*Tritonidae* (Triton Shells).

CASE 18.—*Muricidae*, a large family of mostly spiny and roughened shells.

CASE 19.—*Nassidae* (Dog Whelks); *Bucinidae* (Whelks); *Turbinellidae*.

CASE 20.—*Fasciolaridae*; *Mitridae* (Mitre Shells); *Volutidae*, a family containing many large and beautifully-colored shells.

CASE 21.—*Marginellidae*; *Harpidae* (Harp Shells); *Olividae* (Olive Shells).

CASE 22.—*Conidae* (Cones), an extensive family living mostly in warm seas.

CASE 23.—*Terebridae* (Auger Shells).

CASE 24.—*Bullidae*.

CASE 25.—Materials illustrating two groups of Mollusks, many of whose members have the shell rudimentary or wanting entirely. Many of these animals are represented here by beautifully-executed glass models; *Limnaeidae*.

CASE 26.—*Limnaeidae* continued; *Stenogyridae*, this family and the remaining ones, which belong to the order Pulmonata, are air-breathing Mollusks, the largest belonging to the genus *Achatina*. Most of the species live in Africa, where they remain in trees, descending to lay their eggs. Some of the eggs are exhibited.

CASE 27.—*Stenogyridae* continued; *Pupidae*; *Bulimidae*; *Helicidae*

CASES 28, 29, 30, and 31.—*Helicidae* (Air-breathers), a large family containing over 6,500 species. Many of the most



attractive specimens in these cases are from the Philippine Islands. Some species of *Bulimus* reach a length of six inches. They lay large eggs, which resemble those of birds; some of these are shown.

CASE 32.—*Testacellidae*; *Limacidae* (Slugs), a few families of *Pteropoda* and the *Cephalopoda*, a class which includes the Nautilus, the Squids, the Octopus and Argonauts. Specimens of a number of species in alcohol are in Case 2, in Hall 24. A few of the soft *Cephalopoda* are represented by means of glass models. A model of the Giant Squid of the coast of New Foundland is suspended overhead. In Hall 24 is a model of the Giant Octopus of the Pacific Coast of the United States.

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#### HALL 19.

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#### MAMMALS.

CASE 1.—Four representatives of the lower sub-class of mammals, the *Prototheria*. Of these the most interesting is the Duckbill (*Ornithorhynchus*). It is so called on account of its duck-like beak. It is a native of Australia. It is aquatic in its habits and swims with facility. Although a true mammal, the remarkable fact has been discovered that it lays eggs instead of producing living young. The *Echidnas*, or Spiny Ant-eaters, are inhabitants of New Guinea, Tasmania and Australia.

This case also contains members of the second sub-class of mammals, the *Metatheria*, order *Marsupialia*. These comprise the Phalangers, the Bandicoots, the Kangaroos, the Dasyures, all inhabitants of Australia, Tasmania and New Guinea, and the Opossums, dwellers in the Americas. They present many strange and interesting forms of life. The Phalangers usually live in trees and have prehensile tails. Some species subsist on vegetation, others on insects. The "flying phalangers" resemble our flying squirrels, in having a fold of skin which acts as a parachute. The Bandicoots (*Perameles*) burrow in the earth and subsist on roots and grain. The Kangaroos are grass-eating animals. The Dasyures are devourers of flesh. All the other animals belong to the sub-class *Eutheria*, and are continued in Case 2, and the two cases in the center of the room.

CASE 2.—Contains *Edentates (Bruta)*. Among the Edentates shown are Armadillos, the strangely armoured Pichiciago from the Argentine Republic, two species of Sloth, several species of Ant-eaters and two species of Scaly Ant-eaters or Pangolins, from Africa. The Armadillos have most of the skin converted into an armor of bony plates. They live on roots, insects, reptiles and carrion. They are able to burrow with astonishing rapidity. The Pichiciago is a very rare burrowing animal. The Great Ant-eater lives on white ants, whose dwelling it tears open with its strong claws. The Pangolins have the body covered with overlapping horny plates. They subsist on ants.

This case also contains two representatives of the Sirenia. These are aquatic herbivorous animals which, in external form, resemble the whales. They have, however, no close relationship with the latter animals. The uppermost specimen is the American Manatee, or sea-cow, a resident of Florida. The lower specimen is the Dugong from Australia.

CASE 3.—Hogs and Peccaries. The Peccaries here shown go in small herds of eight to ten, and are not as pugnacious as is another species found in South America. This case also contains three interesting species of deer, the Muntjac; the little deer, *Cervus steerii*, the type of its species; and the Sambur of India.

CASE 4.—Female Wapiti; The male of this species is in Alcove 99, West Court.

CASE. 5.—Reindeer and its close relative, the Caribou, from Maine. These are the only deer the females of which have well developed horns.

This case also contains the female Moose.

CASE 6.—The male moose.

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#### HALL 20.

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CASE 7.—Several species of deer, including the Pronghorn or American Antelope.

CASE 8.—Two species of Antelope from British East Africa—Lichtenstein's Hartebeest, and Cooke's Hartebeest.

CASE 9.—The Sassabye.

CASE 10.—Two species of Gnus, the White-tailed Gnu and the White-Bearded Gnu.

CASE 11.—Salt's Dik-dik, Eastern Abyssinia; Kirk's Dwarf antelope, British East Africa, a very small species of antelope, remarkable for its projecting and distensible snout, and for the tuft of hairs between the horns. It is said to frequent rocky hills. The case also contains the Indian antelope, the Palla, and the Waterbuck.

CASE 12.—The Indian gazelle, India; the Persian gazelle, and Grant's gazelle, Africa.

CASE 13.—Contains a fine example of the Roan antelope, a stately animal from Africa.

CASES 14 AND 15.—A number of goats and sheep from various regions of the world.

CASE 16.—An example of the Musk-Ox, from Great Slave Lake and the Tamaroa, three specimens. The Tamaroa is one of the most generalized of the buffalos. It inhabits the Philippine Archipelago.

CASE 17.—Old male, young male, cow and calf of the American Bison.

CASE 18.—Malayan Tabir, Burchell's Zebra and Common zebra.

CASE 19.—Grevy's Zebra, male and female, from East Africa.

CASE 20.—Contains the gnawing animals (*Rodentia*). Among these are exhibited specimens of the Squirrels, Spermophiles, Rats, Mice, Muskrats, Beavers, Hares, Rabbits, the Capybara, Chinchillas and Porcupines. The Capybara is the largest living rodent. It is the prey of the Jaguar. The Chinchilla (*Lagidium*) here shown is not the true Chinchilla so prized for its soft fur. The Porcupines are remarkable for their long sharp spines. They are not able to shoot these out at their enemies.

CASE 21.—In this case begins the extensive order of flesh-eating animals (*Carnivora*). In the upper division of the case are exhibited several species belonging to the interesting family of cats; in the lower portion are Lions and Tigers, a male and female of each.

CASE 22.—Specimens of two species of Hyenas, and several species of Dogs and Foxes.

CASE 23.—Three Grizzly Bears, two adults and one young. In this case are also exhibited the Polar Bear; species from the Hymalayas and Japan, and the Sun-bear from Borneo. •

CASE 24.—The upper portion of this case contains the *Procyonidae* (Raccons, Panda, etc.), and the lower part contains species which belong to the large family of Mustelidæ. Among the interesting forms are the Otters, Sea-otter, the Skunks, Badgers, Martens, the Glutton, etc.

The Minks, Wolverine, etc., are in the lower portion of Case 25, in the upper part of which are displayed the Insectivora, among which are found the strange Tenrec (*Centetes*) of Madagascar, the Solenodon from Cuba, the Hedge-hog, the Shrews, the Moles, and the so-called Flying Lemur (*Galeopithecus*) from Sumatra.

CASE 26.—In the south half of this case are Chiroptera (bats), among which are some large and remarkable species. The larger species belong to the family of Fruit-bats, living on fruits and the juices of plants. The smaller bats subsist mostly on insects.

In the south half of this case, and in Case 27, are representatives of the order Quadrumana, containing the Lemurs, Monkeys and Chimpanzee. Some twenty-seven species are here shown. There is a case of Orangs and another of Proboscis monkeys exhibited in the West Court.

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## HALL 22.

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### FISHES AND REPTILES.

In this Hall are representatives of the cold-blooded vertebrates or vertebrate-like animals which are included in the following classes: *Tunicata* (the Ascidians); *Leptocardii* (the Lancelets); *Marsipobranchii* (the Lampreys); *Pisces* (the Sharks Rays and the true fishes); *Batrachia* (Salamanders, Frogs, Toads, etc.); *Reptilia* (Snakes, Lizards, Turtles, etc.).

The first four classes are represented in the six cases in the north half of the hall, the remaining two classes are in the three cases in the south quarter of the hall, while the remaining two cases contain animals too large to be placed in the other cases where they properly belong.

CASE 1.—This case contains some material representing the group of Ascidians (*Tunicata*). It consists almost wholly of glass models. There is also a small amount of material belonging to the *Leptocardii* and the *Marsipobranchii*.

CASES 1 TO 6.—The true fishes begin in Case 1. As far as possible they are arranged in systematic order, beginning with the *Selachii* (Sharks) and ending in Case 6 with the *Pediculati* (Bat-fishes, etc.).

CASES 7 AND 8.—Contains fishes and reptiles too large to be placed in cases where they properly belong. The labels indicate their position in the series.

CASE 9.—*Amphibia*. The collection of amphibians is small, and is arranged in the upper portion of this case. Only two forms are represented, *Gradientia* (the Salamanders) and the *Salientia* (the Frogs, Toads, etc.).

The *Reptilia* also begin in this case and are continued in Cases 9, 10 and 11. The living orders are represented; *Rhynchocephalia*, embrace the New Zealand, Tuatera; *Squamata*, containing the Snakes and Lizards; *Chelonina*, Turtles; and *Crocodylia*, Crocodiles, Alligators, Gavials. Among the conspicuous reptiles exhibited are the Alligators, the Cayman, the Gavial, the large specimen of the Lace Lizard (*Varanus*), the Pythons, etc.

### HALL 23 AND ALCOVE 97.

The Osteological collection consists of mounted skeletons of over 225 species. These belong to over fifteen orders and thirty families. It affords an excellent means for the study of the vertebrates.

CASE 1.—Occupies the west side of Alcove 97, and contains the skeletons of cold-blooded vertebrates.

CASE 2.—In Hall 23. Contains skeletons of the Ostrich, Emu, and the Rhea.

CASE 3.—The remainder of the birds. The rest of the cases contain the skeletons of mammals, the arrangement corresponding to that of the mammals in Halls 19 and 20, viz: beginning with the Prototheria and ending with the Quadrumana. In the middle of Hall 23 are skeletons of the Giraffe, Elephant, Hippopotamus and the Rhinoceros; in the middle of Alcove 97 the Camel and Wapiti.

## HALL 24.

## SPONGES JELLY FISH CORALS ETC.

In this hall are exhibited materials illustrating the branches of the animal kingdom known as the *Protozoa* (the one-celled animals), the *Coelenterata* (Sponges and Corals), and the *Echinodermata* (Crinoids, Starfishes, Sea-Urchins and Sea Cucumbers).

CASE 1.—Contains on one side the *Protozoa*, mostly animals of microscopic size. These are illustrated by models representing them magnified about 2,300 times. Next in order are the *Porifera* or Sponges. These include some interesting forms such as Neptune's cup, the Glass-rope sponge, Venus' flower basket, etc. On the other side of the case are the Millepores, and Stylasters, and models representing the Jelly-fishes—such as the Portuguese Man of War.

CASE 2.—Contains representatives of the *Alcyonaria* (Eight rayed Polyps). This group contains the Sea-fans, Sea-feathers, Organ-pipe Coral and Red Coral. These are continued in Case 3.

CASES 3, 4, 5 and 6.—Contain the *Zoantharia*, which includes the Sea-whips, the Sea Anemones and the Stony corals. At the end of Case 6 are a few models representing the *Ctenophora* or Comb-bearing Jelly-fishes.

CASE 7.—Contains part of the *Echinodermata*, which includes the *Crinoidea* (Sea Lilies, etc.); the *Ophiuroidea* (Brittle stars and Basket stars) and part of the *Asteroidea* (Star fishes).

CASE 8.—Contains the remainder of the Star-fishes, and a portion of the *Echini* (Sea-Urchins).

CASE 9.—In this case are specimens of Sea Urchins, *Holothuria* (Sea Cucumbers), and the *Vermes* (Worms).

## HALL 25.

## INSECTS, CRUSTACEANS AND MOLLUSKS

CASE 1.—Collection of Crustaceans. The glass models show several stages in the development of the Lobster. In the south end are a few Cephalopods.

CASE 2.—A collection of about 2,000 Butterflies and Moths.

This hall also contains shell cases, 17 to 32, for an account of these see south court, page 91.

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### STUDY COLLECTIONS.

The study collection of Mammals, Fishes, Reptiles and Insects, consisting of thousands of specimens contained in tin air tight cases and glass jars, is located in the balcony over the south entrance, and is accessible during museum hours to those who may desire to study the material or compare specimens. Every attention is paid to this important adjunct to zoological material for the assistance of scientific investigation and it is hoped that they may eventually be ranked among the most important collections in the United States.



## DEPARTMENT OF ORNITHOLOGY.

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This department occupies Halls 26 and 27 and Alcove No. 100, adjacent to the West Court.

Alcove No. 100, which contains the collection of nests and eggs, should be made the starting point, as the sections in Halls 26 and 27 are numbered with reference to it.

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### HALL 26.

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#### GENERAL ORNITHOLOGY.

In this hall are represented about 540 species illustrating the characteristics of about 100 families. They are arranged systematically, beginning with the degenerates, which have lost the power of flight, and the diving birds, and ending with the highly specialized sparrows.

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#### WALL CASES.

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SECTIONS 1, 2, 3.—Emu, Rhea, Cassowary, Apteryx; Penguins.

SEC. 4.—Grebes, etc.; Long-winged swimmers: gulls, terns, skimmers; Tube-nosed swimmers: albatross, petrels.

SEC'S 5, 6.—Plovers, sandpipers, curlews, bustards, cranes, rails, screamers.

SEC'S 7, 8.—Ducks, swans, flamingoes.

SEC. 9.—Storks, herons, ibises.

SEC. 10.—Pelicans, gannets, cormorants, snakebirds.

SEC'S 11, 12, 13, 14, 15.—Birds related to domestic fowls: turkeys, curassows, pheasants, peafowl, guineas, grouse, quail, the hoatzin from South America—noted for having two fingers and claws on each fore limb at birth which enable it to climb about much like a quadruped till near maturity, when, not being needed, they gradually disappear,—and the megapode from Australasia which buries its eggs and leaves them to hatch by heat from the sun or from decaying vegetation, the young being able to care for themselves at birth.

- SEC. 16.—Pigeons.  
 SEC'S 17, 18.—Vultures, hawks, owls.  
 SEC'S 19, 20.—Parrots, cockatoos, macaws.  
 SEC. 21.—Cuckoos.  
 SEC. 22.—Plantain-eaters, night-jars, rollers.  
 SEC. 23.—Kingfishers, motmots, bee-eaters.  
 SEC. 24.—Hornbills.  
 SEC. 25.—Toucans, woodpeckers, swifts.  
 SEC. 26.—Trogans, humming-birds, lyre birds.  
 SEC. 27.—Broadbills, pittas, tyrant fly-catchers, cotingas.  
 SEC. 28.—Woodhewers, ant-birds, Old World fly-catchers, bulbuls, warblers, larks, wrens.  
 SEC. 29.—Thrushes, cuckoo-shrikes, drongos.  
 SEC. 30.—Waxwings, wood-swallows, shrikes, swallows, tits, Old World orioles.  
 SEC'S 31, 32, 33.—Bower birds, birds of paradise.  
 SEC. 34.—Crows, jays, magpies.  
 SEC. 35.—Starlings, honey-birds, creepers, sunbirds.  
 SEC. 36.—Tanagers, weaver-birds, American orioles, finches.

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### CENTER CASES.

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CASE A.—A group illustrating the peculiar domestic arrangements of the rhinoceros hornbill during the breeding season.

CASE B.—“A Surprised Mother,” representing a domestic hen as mother of a lot of ducklings that are represented as plunging into a basin of water.

CASE C.—A group showing the nesting site and a pair of prairie chickens.

CASE D.—A group of quail in various attitudes.

CASE E.—A group of the American eider duck.

CASE F.—A group of the American robin, showing the nest and eggs and the parent birds much excited by the approach of a black snake.

CASE G.—A group representing a section of a pond with the shore line fringed with grass. A group of ducks are shown; some stand on the shore, and others are swimming about near

the edge of the pond, while in the background, half hidden by the grass, a Florida lynx is seen stealing upon the unsuspecting birds. Three species of ducks are shown in this group: The pintail, lesser scaup duck and ring-necked duck.

CASE H.—A group composed of an adult African ostrich, a chick and an egg.

CASE I.—Winter scene in the far North illustrating the protective coloration of birds inhabiting high latitudes.

## HALL 27.

### NORTH AMERICAN ORNITHOLOGY.

Devoted exclusively to North American birds, with an idea of giving special prominence to the ornithology of Illinois. The specimens are arranged by families in vertical sections beginning at the right hand of the entrance from Hall 26 and going round the hall, the sequence being that adopted by the American Ornithologists' Union.

### WALL CASES.

SEC. 1.—The diving birds: grebes, loons, auks.

SEC'S 2, 3, 4.—The long-winged swimmers: jaegers, gulls, terns.

SEC'S 5, 6.—Tube-nosed swimmers: albatrosses, petrels; Totipalmate birds: pelicans, snake-birds, man-o-war bird, cormorants.

SEC'S 7, 8, 9, 10, 11, 12.—Ducks, geese, swans.

SEC. 13.—Flamingoes.

SEC'S 14, 15, 16.—Wading birds: spoonbills, ibises, herons, bitterns.

SEC'S 17, 18.—Marsh birds: gallinules, rails, cranes.

SEC'S 19, 20, 21.—Woodcock, sandpipers, plovers, curlews, etc.

SEC'S 22, 23.—Gallinaceous birds: grouse, quail, turkeys.

SEC. 24.—Pigeons.

- SEC'S 25, 26, 27.—Birds of prey: owls, hawks, eagles.  
 SEC. 28.—Parrots, cuckoos, kingfishers.  
 SEC. 29.—Woodpeckers.  
 SEC. 30.—Goatsuckers, swifts, hummingbirds.  
 SEC. 31.—Crows, jays.  
 SEC. 32.—Blackbirds, orioles, meadow larks.  
 SEC. 33.—Seed-eating birds: sparrows, grosbeaks, etc.  
 SEC. 34.—Tanagers, swallows, waxwings, shrikes, vireos.  
 SEC. 35.—Warblers, wrens, mocking birds.  
 SEC. 36.—Creepers, nuthatches, titmice, thrushes.

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### CENTER CASE.

In the center of Hall 27 is represented a "rookery" of the American Egret.

In the gallery of this hall is the study collection consisting of some 28,000 birdskins, mainly from North America and the West Indies. Access to this collection may be had at any time by applying to the Curator of this Department.

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### HALL 32.

H. N. Higinbotham Hall.

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### GEMS AND JEWELS.

The collection of gems and precious stones that, during the World's Columbian Exposition, attracted so much attention at the Tiffany pavilion in the Manufactures Building, and in the gallery of the Mines and Mining Building, occupies the central cases in this hall. It is believed to be the most complete collection in existence, for it contains nearly every known gem or precious stone, in the finest cut examples, as well as crystals, cleavages or rolled grains, always of gem value. Many of the objects in the collection are of historical interest and of world-wide reputation.

CASE 1.—Handsome objects made of rhodonite, jasper, and varieties of rare gem stones found in the Ural Mountains,

Asiatic Russia. Prominent objects are a rhodonite jewel casket, rhodonite ink stand, two rhodonite coupes of rare markings, with jasper bases. Rhodonite is a favorite stone with the imperial family of Russia.

Three fruit pieces of realistic effect made at Ekaterinburg, Asiatic Russia, composed of the following hard and rare gem stones found in the Ural Mountains: Raspberries of rhodonite, blackberries of amethyst, white currants of chalcedony, plums of onyx and sard, mulberries of citrine, black currants of onyx and red currants of sard. The bases are of Kalkansky jasper and the leaves of precious serpentine.

A composite bust of Empress Eugenie; feathers, opals and red jasper; hat, sard; hair, sard; face, chalcedony; collar, blood-stone; beads, yellow jasper; dress panel, lapis-lazuli; body, sard.

Cane of solid silver, inlaid with discs of turquoise from Kurdistan, southwest Asia.

Florentine mosaic of marble, malachite, etc., representing the Fall of Rome.

CASE 2.—Engraved diamond bust of King William II. of Holland, executed by DeVrees, of Amsterdam, which required all of his spare time for five years. Was shown in 1878, at the Paris Exposition.

A diamond crystal adhering to common boart, from Kimberley, South Africa.

A model of the Dewey diamond, weight  $23\frac{1}{2}$  carats, found in 1855, near Manchester, Va.

Diamond (round boart), weight 41 9-32 carats. This variety is extremely hard, shows a radiated structure if broken, and is peculiar to Brazil.

Cut and uncut specimens of black diamond from Bahia, Brazil, South America.

A collection of over fifty diamonds in their natural state, and a crystal in matrix from South Africa.

Gem gravel containing ruby, sapphire, zircon, tourmaline, quartz, etc., from Ceylon river beds.

A collection of fifteen rubies from the Ural Mountains, North Carolina and Georgia.

Cut and uncut specimens of various colored sapphires, found on the banks of the Missouri river sixteen miles from Helena, Mont.

Uncut specimens of sapphires from Ceylon, Siam, India, and Asiatic Russia.

Richly colored chrysoberyls and alexandrite; from Ceylon and the Ural mountains.

Six star sapphires, from Ceylon, the largest of which weighs 134 karats.

A 99 and a 66 karat yellow sapphire (oriental topaz), a 59 karat blue sapphire, also yellow, pink, white, and other colored sapphires. Spinel, fine red, blue and other colors.

The Chilton doubly-terminated emerald crystal in a matrix of black limestone, from U. S. Colombia.

Emerald crystal six inches in length and about a half inch in diameter, remarkable for its length, from Alexander county, N. C.

CASE 3.—Blue topaz of fine cutting and exquisite luster, from the Ural Mountains, also topazes from Brazil, Ceylon and Colorado.

The 331 $\frac{5}{8}$  karat Hope aquamarine and other fine examples of sea-green, sea-blue, yellow and other colors of beryl.

Beautiful beryls from Maine, Russia and Brazil, also strings of turquoise beads made by the Indians of Santo Domingo, N. M.

CASE 4.—An exceedingly fine collection of quartz and quartz cuttings, notably:—

A large jewel casket composed of twenty-six engraved crystal slabs, mounted in jeweled and enameled silver; style, seventeenth century; original in Ambras Collection, Vienna.

Screen, "The Finding of Moses," engraved on a thin section of rock crystal 9 3-5 inches in diameter, believed to be the largest section of its kind in existence.

Tazza of quartz, engraved to represent a marine festival.

Large crystal sphere, from the summit of Mt. Antero, Colorado, one of the largest crystal balls ever polished.

A group of crystal balls mounted on a stand of metallic leaves, the whole representing fruit and foliage.

A quartz crystal, scratched so as to show the method of slicing quartz in the manufacture of spectacle lenses.

A series of fourteen specimens of crystal intended to show the various steps in the cutting of a brilliant.

Fine examples of cut crystal from Asiatic Russia; seal having a Turkish inscription on one end and a Russian on the opposite; a frame of the seventeenth century; chandelier pendant, eighteenth century, French cutting; a head of a horse and a bust of Ivan Tourgenieff.

A cut crystal, from Mexico, the finest specimen of aboriginal work of this kind ever found in that country.

CASE 5.—Zircons of various colors. A dark golden smoke color, round brilliant, weight  $41\frac{5}{8}$  karats, Kandy, Ceylon. Also one weighing  $46\frac{1}{2}$  karats from same place.

Tourmalines of many colors, from Brazil and Maine.

Fine specimens of phenacite from the Ural Mountains and Colorado.

Rubellites from Brazil, one weighing 21 karats.

Green garnets, Ural cutting, cushion shaped.

Precious garnets: Navajo Nation, New Mexico, Bohemia, and Kimberley, South Africa.

Rare specimens of peridot from the Levant.

Rare specimens of almandite.

Essonites from Maine and Ceylon.

Spodumene, yellow, Minas-Geraes, Brazil.

Carbuncles, Sirian, Pegu, Burma.

Spessartites from Virginia.

CASE 6.—Rock crystal from Madagascar, Brazil, and Ural Mountains. A beautiful collection of the doubly-terminated quartz crystals, loose and in the matrix, from Herkimer county, New York, commonly known as Little Falls diamonds.

Cats-eye quartz from Bavaria, North Carolina and Ceylon.

Thirteen cut and two uncut specimens of rose quartz from near Albany, Oxford County, Maine.

Three polished specimens of plasma from Openau, Baden, Germany.

CASE 7.—Agate section. Natural color, transparent, from Uruguay, South America.

Wood opal from Colorado.

Opal in matrix, from Queensland, Australia.

Flexible sandstone from North Carolina.

Geode from Uruguay.

Polished specimens of banded jasper from Russia.



Agates of Uruguay, South America, grotesquely cut to resemble owls and human faces.

CASE 8.—Cut amethysts from Brazil, France, Ireland, Ceylon, Hungary and Russia; believed to be the finest collection in existence.

Uncut amethysts from Mexico, North Carolina and Russia.

Spanish topazes, a fine series. In the "Spanish topaz" the original coloring of the carbon in the smoky quartz has been changed by the action of heat to the rich hues so much admired.

Cut and uncut smoky quartz from North Carolina, Colorado, Ural Mountains and Switzerland.

CASE 9.—Opals in the natural state, also engraved and polished, from Russia, Queensland, Mexico, and the State of Washington, including the famous Sun God opal from the Hope collection, which is said to have been known in a Persian temple for three centuries. Opalized bone and shells from Australia. Honduras opal.

Fine specimens of tiger-eye, jasper, mocha stones, moss agates, sardonyx, chrysoprase, agates, and chalcedony.

The finest specimen of hydrolite known (the bubble of symmetrical shape being two and one-half inches in diameter) together with numerous beautiful and rare specimens of agate and chalcedony, cut and uncut, from many parts of the world.

CASE 10.—Specimen of crystallized apophyllite from Mexico, a magnificent piece of labradorite and a very beautiful specimen of iron pyrites.

Two sections of a boulder of jade from the western coast of Australia; jadeite from Burma.

Fluorite from Derbyshire and Cumberland, England, one group being encrusted with calcite crystals. Two specimens of antique carving of lion's feet in marble, from Rome, Italy.

Porphyry from Finland and Egypt.

Thulite from Norway. Landscape marble from England.

CASE 11.—Fine collection of crystallized Amazon stone from Pike's Peak, containing several unique specimens of twin crystals; superb moonstones from Ceylon; sunstones from Norway.

Interesting cut specimens of iolite, wollastonite, titanite, kyanite and prehnite.

Gems cut from the so-called "minerals of the rare earths," samarskite, gadolinite, allanite and euxenite, also magnificent groups of diopase, the rarest ore of copper; an interesting series of malachite and azurite from Arizona; a series of cut fluorites.

Ancient Mexican mirror of iron pyrite.

Antique Persian figures of lapis-lazuli; lapis-lazuli from Bolivia, South America.

CASE 12.—Obsidian fragments and obsidian arrow points and ornaments.

A collection of jade ornaments from China, Mexico and New Zealand.

A collection of pearls from Japan, Australia, Algiers, Singapore and California; pearl oyster shells, fresh water mussels, etc.

Collection of amber, precious coral, pink coral ornaments, mummy eye, etc.

Amber with vegetable enclosure. A circular amber bead from Mexico, believed to be the first known appearance of amber as an ornament in ancient Mexico. It was used as an incense in the Aztec temples.

CASES 13, 14, 15, 16, 17 AND 18.—These wall cases contain the Tiffany collection of Indian jewelry, and form the most complete series ever exhibited in any museum. Many of the pieces are very old, of rare forms, consisting of rings, armlets, bosom ornaments, surah holders, ornaments for the forehead, hair, ear, waist, ankles, upper arm, etc., together illustrating the remarkable variety of the ornaments and objects of the jeweler's handicraft practiced in India for more than 2,000 years. The collection is divided into three sections.

First: Objects made from pure unalloyed gold, as worn by the higher caste only, containing diamonds, rubies, emeralds, sapphires, pearls, garnets, rock crystals, etc., and embellished with rich red and green enamels peculiar to the Indian work.

Second: Collection of silver jewelry, consisting of many large and beautifully wrought pieces, worn by a lower caste.

Third: Base metal jewelry, worn by the lowest caste only.

CASE 13.—Contains forty-seven pieces of Delhi jewelry, consisting principally of necklaces and head ornaments of gold set with diamonds, pearls, rubies, emeralds, garnets, turquoises

and crystal, and characterized by the great number of pearls used and the frequency of small emerald pendants as decorations.

A gold necklace with yellow and green sapphire pendants. A pair of ear-rings of red and green enamel and pearls from Goa.

Two heavily wrought gold and silk necklaces from Muttra.

CASE 14.—Contains upwards of fifty examples of jewelry from Bombay, which is remarkable for the few gems used and the great delicacy and artistic feeling shown in the gold work; also, fourteen pieces of Rajputana jewelry which resembles the jewelry of Delhi, but is heavier and less delicate.

Thirteen pieces of jewelry, consisting of surah holders, necklaces, armlets and nose rings from Baddhi. The jewelry from Baddhi is distinguished by the number of small gems used, one surah holder containing 492 rubies and 82 diamonds.

Four gold head ornaments from Bijapore.

One string of gold beads from Gwalior.

CASE 15.—Considerable space is occupied by talisman necklaces and other pieces of jewelry from Jeypore, which show an abundance of enameling. There are also fifteen beautiful specimens of jewelry from Kathiawar, principally necklaces, which resemble those of Delhi, though containing less enamel.

There are also several necklaces from Brahma, and eleven gold belts and necklaces from Amritsar.

CASE 16.—Devoted entirely to a collection of forty-seven pieces of gold jewelry from Gujarat which is characterized by the large quantity of gold and small number of jewels used.

CASE 17.—A collection of silver jewelry which contains many beautiful designs and fine examples of the ingenuity displayed by the oriental silversmiths in joining together the simple parts which united make a symmetrical whole.

The silver-work is from the cities of Gujarat, Rajputana, Amritsar, the Deccan District, Lahore and Bombay.

CASE 18.—Examples of silver jewelry, and jewelry of base metal worn by the lowest caste. The latter while quite heavy is artistically designed, the ornamentation differing in great degree from that employed in silver and gold work.

The jewelry of base metal is mostly from the state of Gwalior.

CASE 19.—Collection of cameos and intaglios engraved upon sardonyx, rock crystal, jasper, topaz, chalcedony, etc.

Collection of antique jewelry from Bulgaria.

Collection of Egyptian, Etruscan, Roman and Greek jewelry.

CASE 20.—Collection of Egyptian jewelry.

Collection of Etruscan jewelry. Pompeiian necklace.

Collection of gold nuggets from Washington placer mines, and of crystallized gold from Colorado. Gold nugget from the Klondike.

CASE 21.—Carved bronze eagle on red lacquered stand. Iron Damascene plate.

Solid silver communion plate, pierced by German bullets in the Franco-Prussian war at Saarbrück. This was the first volley fired in the war. A new plate of the style perforated by German bullets in Franco-Prussian war.

Pair of carved wood figures, silver mounted, made in 1673, from Lord Charlemont's collection.

A carved ivory ornament taken from Shakespeare's home.

An engraved mother of pearl and silver box from Kenilworth Castle.

An antique snuff box of brass and copper from Holland.

CASE 22.—Crown worn by the Duke of Sussex at the coronation of Her Majesty, Queen Victoria.

Two large and handsomely designed maces of solid silver which were carried in advance of a Maharajah by his attendants on all state occasions. The most prized possessions of a Maharajah are his maces. He may lose his jewels, his money, his lands and his friends, but very seldom is he willing to part with the emblems of his authority, consequently very few maces have ever been brought out of India.

Two large and handsome tortoise shell combs, the larger one measuring fourteen inches in breadth and twelve inches in height.

Card case, enameled work, sterling silver, hand painted, representing a bride in the national costume of Norway.

Walnut of silver containing a landscape made of natural pieces of Colorado native silver, gold, etc. Made in Denver.

Watch with Turkish numerals made in France in the latter part of eighteenth century for a Turkish dignitary. Enamel work on back. It is yet in good running order.

Silver gilt wine cup in the form of a ship, such as were much used in England in the sixteenth century.

CASES 23 and 24.—Remarkable collection of aboriginal American jewelry, found in various parts of Colombia and Ecuador, South America. The collection consists for the most part of objects used for personal adornment. It exhibits surprising ability of workmanship in metals and knowledge of alloying.

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#### ALCOVE 105.

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CASE 25.—Coins of gold, electrum, silver, bullion, potin, aluminum, nickel, bronze, copper, brass, iron, tin, lead, glass, porcelain and paper, illustrating the metallurgy of coinage.

Ancient coins—Roman, Greek and Italian.

Collection illustrating folk lore of precious stones. A large number of specimens showing gems and other mineral or organic substances to which healing or talismanic virtues were ascribed.

ALCOVE WALLS.—Shield of steel and gold (5 feet by 8 feet) upon which are illustrated scenes in the Norse legend of Frithiof and Ingeborg.

Bronze group—Lafayette and Washington, by Bartholdi, the eminent French sculptor.

## DEPARTMENT OF ANTHROPOLOGY.

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NATURE AND PURPOSE OF COLLECTIONS.—The collections brought together in the Department of Anthropology are intended mainly to illustrate the more primitive or uncivilized phases of the development of the human race. There are two well-marked divisions of the subject, and the materials illustrating them are separately installed. One relates to man himself, to his physical and mental constitution and powers, and the other to the works of his hands, to the visible phenomena of culture.

The first division consists of apparatus used in studying the greatly varied physical phenomena, and extensive collections of crania, casts and other objects, articles and materials, illustrating the physical characteristics of the race. These exhibits are arranged in the gallery of the East Court.

The second division comprises very extensive exhibits of the handiwork of man, which are placed on the main floor of the courts and the halls of the southeast section of the building.

The works of living or historic peoples, are for the most part, assembled according to the tribe or nation to which they pertain; those of prehistoric peoples are brought together in groups according to the locality from which they are derived, or to the people, time, or stage of progress they are thought to represent, or, otherwise, with reference to some other special subject to be illustrated.

The various groups thus indicated are placed in the halls in an order corresponding as far as possible with their original geographic relations. In this way the various objects and articles, and through them the people represented, are conveniently studied and compared. It is also possible, with this arrangement, to illustrate the striking and profound effect of environment—the local animal, vegetal and mineral resources and the varied geographic and climatic conditions—upon the people and culture of each region.

ORIGIN OF COLLECTIONS.—As to their origin the exhibits may be grouped in three principal categories: (1) Collections made for the World's Columbian Exposition by its Anthropological Department and turned over to the Museum at the close of the Fair; (2) Collections from various sources exhibited by the owners at the World's Fair, in the Anthropological building and elsewhere, and acquired by the Museum by gift or purchase; (3) Materials not shown at the Fair, but acquired by gift, collection or purchase subsequently to the foundation of the Museum.

Of the first class the more notable are ethnological collections from Alaska, British Columbia, Canada, California and the Middle and Eastern States; casts of Mexican, Central American and Peruvian antiquities; and archeological collections from Ohio Mounds. Of the second class are a collection of North American ethnological material donated by Mr. Edward E. Ayer; the Hassler collection of featherwork and other ethnological specimens from the Indians of Paraguay; the Montez collection of Peruvian antiquities; the Wyman collection of copper implements and relics of stone from Wisconsin; the Gunning collection of idols; the Colombian collection of objects of gold, earthenware and stone; the Boas collection of skulls; the Riggs collection of archeologic material from the Southern States; the Johnson collection of reproductions of Irish antiquities; the Finsch collection from New Guinea; the Peace collection from New Caledonia; the Remenyi collection from South Africa; the Pogosky collection from Siberia; the Green cliff house collection; the Javanese collection; the Lumholtz collection of ethnological objects from Northern Mexico; and various collections from Alaska. Of the third class are Pueblo models, pottery and quarry material donated by the Bureau of Ethnology and National Museum; Berlin collection of Egyptian casts; Harris collection of Peruvian antiquities; Bruce collection from Alaska; collection of Mexican antiquities donated by Mr. Allison V. Armour; the great collections of Mr. Ayer from Italy and Egypt; the Keam collections from the ancient Pueblo region of Arizona; the Korean collection presented by Mr. H. H. Higinbotham; and the Hopi collection donated by Mr. Stanley McCormick.



**PLACEMENT OF COLLECTIONS.**—The Department occupies the North Court, the East Court, the east alcoves of the South Court, the southeast section of the main building, the southern series of halls of the northeast section, and the east and south galleries of the East Court.

The North Court is occupied mainly by collections illustrating the archeology of Europe.

The East alcoves of the South Court are devoted to overflow collections of North American ethnology.

The East Court and its alcoves contain groups of exhibits relating to North and South American archeology.

In Hall O are installed American aboriginal games of skill and chance. Hall 9 is filled with Egyptian antiquities, and the halls on the north side (2, 4, 5, 6 and 7) are occupied by collections illustrating the ethnology of Africa, Asia, Pacific Islands and of the Eskimo.

The southeast section is devoted to the ethnology of America. Hall 18 or Ayer Hall is devoted especially to the collections donated by former President Ayer. These exhibits pertain largely to tribes of the great interior region. Halls 12 and 13 contain exhibits from the Northwest Coast, beginning at the southwest with South Alaska, and ending at the northeast with the State of Washington.

Halls 14, 15, are devoted to the ethnology of California and tribes of the southwest respectively. Halls 16 and 17 are devoted to the ethnology of the Hopi Indians of Arizona. Halls 30 and 31 contain collections illustrating the ethnology of South America, and Hall 33 is devoted to ceramics.

The physical laboratories and collections illustrating physical anthropology, occupy the galleries of the East Court.

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## NORTH COURT.

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### EUROPEAN ARCHEOLOGY.

The central floor space and many of the alcoves of this court are devoted principally to European archeology.

**CASES 1, 6 AND 7.**—Contain the Johnson collection of reproductions of Irish antiquities, consisting of crosses, croziers,

shrines, bells, harps, drinking-horns, vases and personal ornaments. This is justly regarded as a most remarkable and interesting collection—the reproductions having been made with the utmost care.

CASES 2, 5, 8, 9, 10, 12, 13, 14, 15, 16, 18, 19, 21, 22, AND 24.—Contain many Roman antiquities a large part of the bronzes being reproductions from the originals now preserved in the Naples Museum. Of the reproductions, special attention may be called to the tables, braziers, chairs, etc., installed on pedestals in the court and alcoves. These collections were assembled by President E. E. Ayer during the years 1894, '95 and '96.

CASES 3 AND 4.—Contain nearly two hundred examples of the exquisite glassware of the ancient Mediterranean nations. Much of the great number are credited to the Romans, whose influence and art extended over so many widely separated regions, but it is believed that a limited number of specimens are Phœnician. The uses were largely those of the toilet. The forms and sizes are varied, and the color is in many cases attractive and brilliant.

CASES 11, 14, 17, 20, 25, 26, 27, 28, 29, AND 30.—These exhibits are mainly the contents of ancient Etruscan tombs, and consist of urns, vases, ornaments, etc., of especial interest.

ALCOVE 121.—Reproductions of objects of bronze from Pompeii, on pedestals, originals preserved in the Naples Museum.

Collections of South Sea Islands. Ethnographic material loaned by Mr. Wm. Preston Harrison.

ALCOVE 122, CASES 47 AND 48.—The wall cases contain an excellent series of images and other works of art in stone, bronze, wood, earthenware, etc., relating to the religious beliefs and observations of various oriental peoples. Buddhists and Brahmanists subjects predominate. Forming a part of the same series are an elaborately wrought brass incense burner from Benares, India, and the model of a Japanese Budhistic altar, occupying spaces next the doorway.

CASE 23.—Contains an Etruscan funeral bed.

CASE 26.—Contains an Etruscan decorated tomb.

CASE 29.—Contains an Etruscan decorated tomb.

AICOVE 120, CASE 31.—Contains two ancient Roman stone grain mills.

ALCOVE 119, CASES 32 AND 33.—Contain archeological material from Swiss lakes dwellings.

ALCOVE 118, CASES 24, 35, AND 36.—Contain copies of the Bernays and Hildersheim treasures, also replicas of other historical gold and silver plate.

ALCOVE 117, NOS. 37, 38 AND 39.—Three large ancient Roman stone wine jars.

ALCOVE 124.—Reproductions of objects of bronze from Pompeii.

ALCOVE 123, CASE 40.—Contains mural decorations from a village at Bosco Reale, near Pompeii.

CASE 41.—Contains Etruscan tiles, plaques.

CASE 42.—Contains an original Roman bronze bath tub.

CASE 43.—Contains original objects of pronzes of great interest.

CASE 44.—Contains an original Roman bronze bath tub.

CASE 45.—Contains ancient Italian tiling.

CASE 46.—Contains mural decoration from a villa at Bosco Reale, near Pompeii.

## EAST COURT. .

### ARCHEOLOGY OF AMERICA.

#### The Central Floor Space.

The installment of the exhibits in this court and its alcoves cannot be considered permanent, as collections are being added from time to time.

Beginning at the west is a case containing a group of three Indians executed in plaster and elaborated with much detail. They are represented as engaged in the work of quarrying boulders and roughing out stone implements from them, there is also a case containing a model of the Serpent Mound in Adams County, Ohio. About these cases are many interesting reproductions of Central American stone carvings.

The contents of several table cases are devoted to illustrating the ancient flint, copper, soapstone and red pipestone quarries of the United States.

Eleven table cases contain interesting archeological material from Kentucky, Missouri, Illinois, Michigan, Wisconsin, Ohio, Indiana, Maine and Canada, and objects from the Cliff Dwellings of Utah.

Nine table cases on the South side contain interesting and valuable collections from Yucatan, Chiapas, Oaxaca, Mexico and from Nicaragua, Bahama Islands, Santo Domingo and Caldera, Chile.

At the east end of the court are models of the Pueblos of Hanoki, Arizona. Taos, New Mexico, Acoma, New Mexico, and Penasco Blanco, New Mexico.

Swung at various points beneath the galleries are boats representing many primitive peoples, and along the sides and at the ends of the court are exhibited totem poles or heraldic columns from British Columbia and Alaska.

CASES 1 AND 2.—Manufacture of stone implements from Mill Creek, Illinois.

CASE 3.—Manufacture of stone implements from Peoria, Indian Territory.

CASE 4.—Manufacture of stone implements from Flint Ridge, Ohio.

CASE 5.—Manufacture of stone implements from District of Columbia and Arkansas.

CASE 6.—Manufacture of stone implements from Eastern Wyoming.

CASE 7.—Manufacture of gun flints from Brandon, England.

CASE 8.—Aboriginal copper mining implements from Michigan. Manufacture of soapstone vessels from the District of Columbia. Archeology of Kentucky.

CASE 9.—Archeology of Ohio.

CASE 10.—Manufacture of stone implements from Illinois.

CASE 11.—Archeology of the Valley of Mexico.

CASE 12.—Archeology of Illinois and Missouri.

CASE 13.—Archeology of Illinois and Missouri.

CASE 14.—Archeology of the Valley of Mexico.

CASE 15.—Antiquities from ruins of Chichen Itza, Yucatan.

CASE 16.—Copper implements from Wisconsin.

CASE 17.—Stone and copper implements from Wisconsin.

CASES 18 AND 19.—Antiquities from ruins of Xkich-mook, Yucatan.

CASE 20.—Archeology of Wisconsin.

CASE 21.—Archeology of Canada and Indiana.

CASE 22.—Antiquities from Cozumel, Uxmal, Progreso, Tekax, Mugeris Island, Yucatan, and copies of Maya codices.

CASE 23.—Archeology of Nicaragua.

CASE 24.—Shells heaps, Maine.

CASES 25 AND 28.—Basketry, matting, textile materials, woven articles, etc., from Cliff Dwellers of Utah.

CASE 26.—Archeology of Nicaragua, Bahama Islands and Santo Domingo.

CASE 27.—Archeology of Chile.

## HALL O.

American aboriginal games of skill and chance are shown in this hall under classified heads.

CASE 1.—Ring and javelin, and wheel and arrow games.

CASE 2.—Stave and dice games.

CASE 3.—Guessing games.

CASE 4.—Ball games.

CASE 5.—Temporary installation of Tlingit Indian material part of collection in Hall 1.

## HALL 1.

A very large collection of objects from the Tlingit Indians of southeastern Alaska, is temporarily installed in the nine cases in this hall, and in one case of Hall O.

## HALL 2.

## KOREA.

This entire collection in this hall is devoted to the dress, ornaments, utensils, instruments, etc., of Korea, and was presented by Mr. H. N. Higinbotham.

CASE 1.—Cooking pots of soapstone, bowls of brass and musical instruments.

CASE 2.—Costumes of silk.

CASE 3.—Embroidered pillows and beds.

CASE 4.—Costumes, ornaments, implements, utensils, fans, etc.

CASE 5.—Armor, rain clothing, hats, shoes, chest, etc.

CASE 6.—Officer's uniform, etc.

CASE 7.—Costumes of silk.

CASE 8.—Costumes of silk.

CASE 9.—Carved jade ornaments and objects.

### HALL 3.

The collections in this hall are but temporarily installed:

CASE 1.—Implements of stone, baskets, games, etc. Wasco Indians, Oregon.

CASE 2.—Drums, painted and carved hide packing bags, costumes, Warm Springs, Oregon.

CASE 3.—Baskets, Klikitat Indians, Washington.

CASE 4.—Costumes, ornaments, horse trapping implements and utensils, Nez Perce Indians, Idaho.

CASE 5.—Costumes, ornaments, packing bags, musical instruments, Umatilla Indians, Oregon.

CASE 6.—Baskets, games, Paiute Indians, Nevada.

CASE 7.—Costumes, water jars of basketry ornaments, games, utensils, Uintah Ute Indians, Utah.

CASE 8.—Painted hide and beaded bags, utensils, drums, flutes, Shoshone Indians, Wyoming.

CASE 10.—Costumes, utensils, games, etc., Bannock Indians, Idaho.

CASE 11.—Costumes, ornaments, etc., Tonkawa and Ponca Indians of Oklahoma, Comanche Indians, of Indian Territory, and the Menominee Indians, of Wisconsin.

CASE 12.—Personal ornaments, amulets, dance paraphernalia, Shoshoni Indians, Wyoming.

CASE 13.—Objects of dress and ornaments, games, etc., Shoshoni Indians, Wyoming.

CASE 14.—Woven bags, Nez Perce Indians, Idaho.

CASE 15.—Costumes, hats, drum, painted packing bags, Yakima Indians, Washington.

CASE 16.—Costumes, Warm Spring Indians, Oregon.

#### HALL 4.

#### ESKIMO.

This entire hall is devoted to collections from the Eskimo of Alaska, Siberia, Hudson Bay, and Greenland. Several groups with details carefully arranged, impart interest and instruction.

CASE 1.—Sleds, harness and whips.

CASE 2.—Eskimo hunter in kyak, with throwing stick and spear.

CASE 3.—Models of houses.

CASE 4.—Clothing from Yukon River, Alaska.

CASE 5.—Bats, basketry, etc., from Alaska and Siberia.

CASE 6.—Clothing, from Siberia.

CASE 7.—Bows, arrows, throwing sticks and lamps, from Alaska, Siberia and Greenland.

CASE 8.—Cutting and digging implements, from Alaska and Siberia.

CASE 9.—Clothing, from Greenland.

CASE 10.—Harpoons, ice scoops, blubber hooks, from Alaska, Siberia, Hudson Bay and Greenland.

CASE 11.—Darts, paddles, and hunting knives, from Alaska, Siberia and Greenland.

CASE 12.—Eye shades, seal calls, toggles, skin combs, implements, pipes, powder flasks, snuff mortars and masks.

CASE 13.—Rain clothing, from Northern Alaska.

CASE 14.—Industrial group—man drilling ivory and woman dressing a skin.

CASE 15.—Clothing, from Hudson Bay.

CASE 16.—Group of Eskimo family, with dogs and sleds.

CASE 17.—Snow knives, harpoon foreshafts, ivory boxes, man's working knives, net-making implements, ivory carvings, fish lines and bird snares.

CASE 18.—Girl fishing through hole in the ice.

Suspended above are the skin boats. Around the walls are placed fishing nets.



## HALL 5.

## OCEANICA.

This hall is devoted to collections from the islands of the Pacific Ocean and Australia:

CASE 1.—Boomerang spears, shields, etc., from Australia.

CASE 2.—Dresses, personal ornaments, etc., from New Caledonia.

CASE 3.—Spears, baskets, models of dwellings, implements and household utensils, from New Caledonia.

CASE 4.—Spears, from New Caledonia.

CASE 5.—War clubs, slings and sling stones, from New Caledonia.

CASE 6.—War clubs, dresses, tapa and tapa beaters, from Fiji Islands.

CASE 7.—Spears, models of boats, armor, from Solomon Islands.

CASE 8.—War clubs, bows, arrows and spears, from New Hebrides Island.

CASE 9.—Woven grass girdles, and personal ornament, from New Hebrides Island.

CASE 10.—Woven grass mats and bags, clay vessels, baskets, from New Hebrides Island.

CASE 11.—War clubs, paddles, bows and spears, from New Britian.

CASE 12.—Jade implements, personal ornaments, from New Zealand. Ornaments, musical instruments and ceremonial objects, from New Britian.

CASE 13.—Bows, arrows, war clubs and paddles, from Solomon Islands.

CASE 14.—Bow and arrows, from New Guinea.

CASE 15.—Ornaments, spears, utensils, arrows, from New Guinea.

CASE 16.—Bows, arrows, shields, spears, costumes, New Guinea.

CASE 17.—Objects from Torres, Tonga, Byron, Admiralty, Matty, Hervey, and Loyalty Islands.

CASE 18.—Costumes, ornaments, spears, armor and lances, from Gilbert Island. Matting, costumes and implements, from Caroline Islands.

### HALL 8.

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The archeological specimens of the Hopi Indian collections, donated by Mr. Stanley McCormick, are installed in this hall, and consist of pottery, bahos, stone slabs, implements and ornaments, from graves and ruins of Arizona and New Mexico.

CASE 1.—Ruins at Chevalon, twelve miles southeast of Winslow, Ariz.

CASE 2.—Ruins at Homolobi No. 2, seven miles north of Winslow.

CASE 3.—San Cosmos, Arizona.

CASE 4.—San Cosmos, Arizona.

CASE 5.—Ojo Caliente, New Mexico.

CASE 6.—Bittahoochee, Arizona.

CASE 7.—Ruins of Walpi, Arizona.

CASE 8.—Mishongnovi, Arizona.

CASE 9.—Sikyatki, Arizona.

CASE 10.—Sikyatki, Arizona.

CASE 11.—Homolobi No. 1, Arizona.

CASE 12.—Homolobi No. 1, Arizona.

CASE 13.—Homolobi No. 1, Arizona.

CASE 14.—Homolobi No. 1, Arizona.

CASE 15.—Homolobi No. 1, Arizona.

CASE 16.—Holomobi No. 1, Arizona.

CASE 17.—Round Valley, "X Ranch," Arizona.

CASE 18.—Ruins along Little Colorado River, Arizona.

CASE 19.—Various small ruins of Tusayan, Arizona.

CASE 25.—Ruins of Chukubi and Awatobi, Arizona.

CASE 21.—Ruins of Walpi, Arizona.

CASE 22.—Ruins of Walpi, Arizona.

CASE 23.—Ruins of Walpi, Arizona.

CASE 24.—Ruins of Mishongnovi, Arizona.

CASE 25.—Painted stone slabs and bahos, from ruins of Walpi, Arizona.

CASE 26.—Painted stone slabs and bahos, from ruins of Walpi.

Halls 16 and 17 are also devoted to Hopi collections.

## HALL 9.

## EGYPTIAN ARCHEOLOGY.

In this hall are installed the extensive collections brought together by Mr. Edward E. Ayer and others:

CASE 1.—Contains five mummies of younger persons. One of these is remarkable in having a portrait painted on wood substituted for the usual mask, and another has the wrapping removed, so that a good idea of the state of preservation may be gained.

CASE 2.—Mortuary papyrus of a lady named Isty.

CASE 3.—In the small floor case are mummies of two young children with elaborate gilt masks.

CASE 4.—Contains neatly prepared mummies in their original coffins, one of which is wood, and one, a unique specimen, of interlaced bulrushes.

CASE 5.—Two mummies of women in plain wooden coffins. Ptolemaic period 325 to 44 B. C.

CASE 6.—Coffins and mummies of a lady named Tentat. Thebes xxii Dynasty, 10th century, B. C.

Presented by "The Railroad Table of the Chicago Club."

CASE 7.—Mummy case, containing the body of a lady named Dje-Mut-esankh. Thebes xxi Dynasty (about 1000 B. C.) Presented by Mr. James W. Scott.

CASE 8.—Mummy case of a lady named Naja-Rames. xxxii Dynasty, B. C. 700. Presented by Mr. F. H. Winston.

CASE 9.—Mummy of a man named Pu-Nefer. xix Dynasty. B. C. 1200.

CASE 10.—Mummy of a lady named Men, in coffin with light colored lid with yellow stripes, containing inscriptions; 22d dynasty, B. C. 1000.

CASE 11.—Casts of Egyptians rulers, etc.

CASE 12.—Busts and fragments of stone statues.

CASE 13.—Tomb tablets of stone of various periods.

CASE 14.—Mummy of woman in a stooping position.

CASE 15.—Mummies of cats, dogs, jackals, hawks, alligators, etc.

CASE 16.—Wooden mortuary offerings.

CASE 17.—Ushebti figures of wood and implements of iron.

CASE 18.—Bronze figures of various divinities, mirrors, etc.  
Donated by Mr. Watson F. Blair.

CASE 19.—Glazed pottery amulets, temple vessels of bronze.

CASE 20.—Bronze implements and utensils.

CASE 21.—Papyri and personal ornaments.

CASE 23.—Stone and clay mortuary offerings.

CASE 24.—Mortuary offerings of gray schist and stone  
vases.

CASE 25.—Glazed earthenware ushebti figures.

CASE 26.—Writing material, palettes, etc.

CASE 27.—Earthenware vessels.

CASE 28.—Pottery vessels from tombs.

CASE 29.—Earthenware vessels.

CASE 30.—Alabaster vases and objects.

CASE 31.—Alabaster vases and objects.

CASE 32.—Two mummy cases.

CASE 33.—Two mummy cases.

CASE 34.—Alabaster vases.

CASE 35.—Bronze implements and utensils.

CASE 36.—Mortuary boat excavated at foot of Dashur pyra-  
mid.

CASE 37.—Mummy and case and mortuary jars.

CASE 38.—Coffin containing mummy of child named Padi-  
Amon.

Occupying the upper lines on the east and west walls are a  
number of good examples of balcony fronts from modern Cairo,  
and three specimens of colored glass screens.

Upon the north wall above the cases are arranged frames  
containing excellent specimens of mortuary cloths.

The south wall is covered with fragments of stone tombs.

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#### HALL 10.

The installment of this hall cannot be considered permanent,  
and is devoted to collections from the Arapaho, Cheyenne and  
Grosventre Indians.

CASE 1, 2 AND 3.—Arapaho Indian.

CASE 4.—Grosventre Indians.

CASE 5.—Sun dance altar, Cheyenne Indians, Oklahoma.

CASE 6.—Sun dance altar, Arapaho Indians, Oklahoma.

### HALL 11.

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Owing to contemplated changes to be made in this hall it is not possible to give here the location of but the following cases, which must be regarded as temporary :

CASE 1.—Ute Indians.

CASE 2.—Klamath Indians.

CASE 3.—Cheyenne Indians.

CASE 4.—Haida and other Northwest coast Indians.

CASE 5.—Tlingit Indians.

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### HALL 12.

The collections installed in this hall are from the Indian tribes of the northwest coast of America.

CASE 1.—Models of houses, Bella Coola and other tribes.

CASE 2.—Ceremonial paraphernalia, Bella Coola Indians.

CASE 3.—Models of houses.

CASE 4.—Carved, painted and inlaid boxes, painted box drums.

CASE 5.—Ceremonial blankets, Chilkat Indians.

CASE 6.—Dance and ceremonial paraphernalia, fishing appliances, baskets, etc. Haida Indians, Queen Charlotte Islands.

CASE 7.—Masks and dance costumes, etc, Bella Coola Indians.

CASE 8.—Ornaments, utensils, bows, arrows, etc., Bella Coola Indians.

CASE 9.—Ivory carvings, ornaments, pipes, killing clubs, fishhooks and lines.

CASE 10.—Figure of Kwakiutle Indian dancer.

CASE 11.—Stone implements, Bella Coola Indians.

CASE 12.—Horn and wooden spoons.

CASE 13.—Costumes, rattles, whistles, etc., Tsimshian Indian, British Columbia.

CASE 14.—Ceremonial group.

CASE 15.—Bags, utensils, implements, etc., Tsimshian Indians, British Columbia.

CASE 16.—Utensils, implements, ornaments.

### HALL 13.

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The collections installed in this hall are in the main from Washington tribes of Indians, though a few cases are devoted to specimens from Oregon tribes and the northwest coast of America.

CASE 1.—Utensils, implements, rattles, ornaments, etc., Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 2.—Masks and other ceremonial paraphernalia, Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 3.—Ceremonial and dance costumes and ornaments, Makah Indians, Washington.

CASE 4.—Ceremonial canoe accessories, Makah Indians, Washington.

CASE 5.—Baskets, utensils, implements, ornaments, Salishan Stock, Washington.

CASE 6.—Bags, household utensils, games, fishhooks, bows, arrows, Makah Indians, Washington.

CASE 7.—Fishnets, lines, etc., Northwest Coast.

CASE 8.—Masks and other ceremonial belongings, Northwest coast.

CASE 9.—Basket, utensils, games, etc., Klamath Indians, Oregon.

CASE 10.—Basket and materials, etc., Klamath Indians, Oregon.

CASE 11.—Masks and ceremonial costumes, Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 12.—Chests and cradles, Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 13.—Salish home group, Puget Sound, Washington.

CASE 14.—Ceremonial and dance paraphernalia, Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 15.—Wooden dishes, spoons, fishhooks, implements, Kwakiutle Indians, Van Couver Island, British Columbia.

CASE 16.—Costumes, ornaments, bows, arrows, games, etc., Salishan Stock, Washington.

## HALL 14.

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This hall is devoted to Indian tribes of California, and in the collections exhibited may be seen many rare baskets of great value.

CASE 1.—Baskets, utensils, implements, games, ornaments, etc. Mono Indians.

CASE 2.—Basketry, implements, utensils, etc., Tulare Indians.

CASE 3.—Ornamental and dance costumes and ornaments. Poma Indians.

CASE 4.—Utensils, bows, arrows, headdress, etc., Tulare Lake Indians.

CASE 5.—Baskets, ornaments, foods, games, implements, etc., Kings River Indians.

CASE 6.—Dance paraphernalia, Hupa Indians.

CASE 7.—Bows, arrows, utensils, games, ornaments, Tribes of Moquelumnian stock.

CASE 8.—Basketry, utensils, implements, games, etc. Tcuktansi Indians.

CASE 9.—Basketry, utensils, pipes, implements, etc., tribes of Mariposan stock.

CASE 10.—Basketry, wooden bowls, utensils, Mono Indians.

CASE 11.—Basketry, utensils, implements, etc., Shoshonean stock.

CASE 12.—Baskets, tribes of Moquelumnian stock.

CASE 13.—Baskets, basket materials, costumes, ornaments, games, snares, cradles, musical instruments, tribes of the Mariposan stock.

CASE 14.—Pipes, implements, successive stages of the manufacture of money, etc., Poma Indians.

CASE 15.—Bows, arrows, quivers, games, implements, etc., Hupa Indians.

CASE 16.—Ornaments, musical instruments, etc., Mono Indians.

CASE 17.—Boat, fishnets and weirs, Poma Indians.

CASE 18.—Baskets, ornamented with feathers and beads, Poma Indians.



### HALL 15.

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Interesting specimens of the handwork of the Navaho Indian weavers and silversmiths, Pima and Apache basket makers, and other ethnological objects from tribes of the Southwest are installed in this hall.

CASE 1.—Blankets, looms and clay vessels, Navaho Indians, Arizona.

CASE 2.—Baskets, Apache Indians, Arizona.

CASE 3.—Baskets, Apache Indians, New Mexico.

CASE 4.—Ornaments, utensils, games, etc., Yuma Indians, California.

CASE 5.—Costume, ornaments, games, utensils, foods, etc., Walapai Indians, Arizona.

CASE 6.—Earthen vessels, utensils, etc. Mohave Indians, Arizona.

CASE 7.—Pottery, utensils, ornaments, games, musical instruments, Papago Indians, Arizona.

CASE 8.—Baskets, etc., Pima Indians, Arizona.

CASE 9.—Games, etc., Pima Indians, Arizona.

CASE 10.—Medicine man's outfit and masks, Navaho Indians, Arizona.

CASE 11.—Costumes of medicine man, and ceremonial belongings, etc. Apache Indian, Arizona.

CASE 12.—Costumes, Apache Indians, Arizona.

CASE 13.—Shields, bows, arrows and quivers, implements, etc., Apache Indian, Arizona.

CASE 14.—Beaded pouches, dolls, games, etc., Apache Indians, Arizona.

CASE 15.—Ornaments, bead work, games, etc., Mohave Indians, Arizona.

CASE 16.—Costumes, etc., Navaho Indians, Arizona.

CASE 17.—Models of winter and summer homes, Navaho Indians, Arizona.

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### HALL 16.

The collection in this hall is devoted to the religion and ceremonies of the Hopi Indians of Arizona, and was presented by Mr. Stanley McCormick.

Other parts of the Hopi Indian collection will be found in Halls 8 and 17.

CASES 1, 2, 3, 4, 5, AND 6.—Contain dolls or katchinas and ethnological and ceremonial objects.

CASES 7 AND 8.—Ceremonial masks and head dresses.

CASE 9.—Cho altar and sand mosaic.

CASE 10.—Masililanti altar.

CASE 11.—Katchina initiation, sand mosaic.

CASE 12.—Ana Katchina dancers.

CASE 13.—Hemis Katchina dancers.

CASE 14.—Powamu altar and sand mosaic.

CASE 15.—Powalawu sand mosaic.

CASE 16.—Tcol altar and sand mosaic.

CASES 17 AND 18.—Ceremonial masks and head dresses.

### HALL 17.

The collection in this hall is devoted principally to the archeology of the Hopi Indians of Arizona, and to the domestic side of their modern life, the main portion of which was presented by Mr. Stanley McCormick.

Other parts of the Hopi Indian collections presented by Mr. McCormick will be found in Halls 8 and 16.

CASE 1.—Soyal altar, with star and war gods.

CASE 2.—Maraw altar.

CASE 3.—Ooqol altar and priestess.

CASE 4.—Women's ceremonial costume.

CASE 5.—Costumes of men, women and children.

CASE 6.—Katchina and snake dance costumes.

CASE 7.—Model of Pueblo, of Walpi.

CASE 8.—A Hopi home, illustrating the domestic pursuits.

CASE 9.—Utensils and ethno-botanical specimens.

CASE 10.—Household utensils, stone implements and ornaments.

CASE 11.—Ballukon screen.

CASE 12.—Costumes and stone implements.

CASE 13.—Costumes and stone implements.

CASE 14.—A boomerang thrower.

CASE 15.—A bride.

CASES 16 AND 17.—Meal trays of basketry.

## HALL 18.

Edward E. Ayer Hall.

## TRIBES OF THE GREAT PLAINS.

This hall is devoted to the so-called tribes of the Great Plains, principally of the Siouan stock, though there are temporarily installed here collections from tribes of the Algonquin and Iroquois stock.

This hall contains only a small part of the gift of Mr. E. E. Ayer. Upon the north wall are arranged the original Catlin paintings of Indians. Suspended from the ceiling are canoes of various tribes.

CASE 1.—Costumes, ornaments, ceremonial objects, Osage Indians, Oklahoma.

CASE 2.—Matting, woven bags, bowls, ladles, pipes, etc., Osage Indians, Oklahoma.

CASE 6.—Painted hide tipi lining, sleds, harness, utensils, etc. Cree Indians, Alberta, Northwest Territory.

CASE 7.—Decorated hide tipi lining, wooden bowls, ladles, utensils, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 8.—Drums, rattles, bows, arrows, ceremonial objects, games, etc., Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 9.—Wooden bowls, ladles, mortars, utensils, packing bags, Sauk and Fox Indians, Iowa. Wooden household utensils, etc., Micmac Indians, Nova Scotia.

CASE 10.—Beadwork. Chippeway Indians, Minnesota. Packing bags, Kickapoo Indians.

CASE 11.—Men's costumes and ornaments, pipes and bags, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 12.—Women's costumes and ornaments, Blackfoot Indians, Montana and Alberta, Northwest Territory.

CASE 13.—Rabbit skin robe, child's robe, objects for women's use and wear. Cree Indians, Alberta, Northwest Territory.

CASE 14.—Man's costumes, pipes, ornaments; games, etc., Cree Indians, Alberta, Northwest Territory.

CASE 15.—Games, musical instruments, head dresses, ornaments, amulets, pipes, etc., Crow Indians, Montana.

CASE 16.—Horse trappings, painted tipi door flap, painted and carved hide bags, medicine bags, etc., Crow Indians, Montana.

NO. 17.—Decorated hide tipi. Cree Indians, Alberta, Northwest Territory.

CASE 18.—Men's and boys' costume, war bonnets, Crow Indians, Montana.

CASE 19.—Women's and girls' costume and blankets, cradles, etc., Crow Indians, Montana.

CASE 20.—Buffalo hide shields, Crow Indians, Montana.

CASE 21.—Buffalo hide shields, Crow Indians, Montana.

CASE 22.—Buffalo hide shields, Crow Indians, Montana.

CASE 23.—Buffalo hide shields, bows and arrows, Crow Indians, Montana.

CASE 24.—Shields, bows, arrows, rattles, flutes, etc., Osage Indians, Oklahoma.

CASE 25.—Costumes, pipes, etc., Oto Indians, Oklahoma.

CASE 27.—Woven bags, drums, wooden bowls, ladles, mortars, etc., Winnebago Indians, Wisconsin.

CASE 28.—Drums, flutes, medicine bags, beaded pouches, horn spoons, etc., Sioux Indians, North and South Dakotas.

CASE 29.—Stone war clubs, bows, arrows, etc., Sioux Indians, North and South Dakotas.

CASE 30.—Saddles, saddle cloths, beaded bags, painted bags, Sioux Indians, North and South Dakotas.

CASE 31.—Beaded cradles, dolls, amulets, etc., Sioux Indians, North and South Dakotas.

CASE 32.—Decorated buffalo hide, dancer ornaments, etc., Sioux Indians, North and South Dakotas.

CASE 33.—Ceremonial objects, rattles, drums, flutes, etc., Iroquois Indians, Canada.

CASE 34.—Masks worn in the ceremony of the burning of the white dog. Iroquois Indians, Canada.

CASE 35.—Hair ornaments, men's costumes, etc., Sioux Indians, North and South Dakotas.

CASE 36.—Womens' and girls' costumes, etc., Sioux Indians, North and South Dakotas.

CASE 37.—Pipes, pipe cleaners, beaded pipe bags, Sioux Indians, North and South Dakotas.

CASE 38.—Painted robe, ornaments, ceremonial objects, games, Yankton Sioux, Montana.

CASE 39.—Rattles, carved wooden bowls, horn spoons, etc., Cuthead Sioux, North Dakota. Ornaments, games, etc., Sisseton Sioux, North Dakota.

CASE 39.—Berry bags, saddles, drums, head dresses, costumes, etc., Assinaboin Indians, Montana.

### HALL 30.

In this hall are installed collections from the Sierra Madre Indians of Mexico. Modern Mexican ceramics, blankets, ponchos, and other objects of wearing apparel, implements of war and of the chase, household utensils, etc., from tribes of Colombia, Costa Rica, Peru, Bolivia, Paraguay, and Brazil.

Upon the north wall are arranged replicas of Mexican feather shields.

CASES 1, 2, 17 AND 18.—Indian tribes of Mexico.

CASE 3.—Goohiba, Paya and Plain tribes, Colombia.

CASE 4.—Salamanca Indians, Costa Rica.

CASES 5 AND 12.—Jiveros Indians, Peru.

CASE 6.—Chunchos Indians, Peru.

CASES 7 AND 11.—Tribes of Brazil.

CASES 8, 9 AND 10.—Tribes of Paraguay.

CASES 13, 14, 15 AND 16.—Quichma and Aymara Indians of Peru and Bolivia.

### HALL 31.

One side of this hall contains valuable collections from Venezuela and British Guiana. The other side of the hall contains collection from the Gran Chaco tribes. The most northern of the groups inhabit Brazil and Bolivia, while the more southern extend into the Argentine Republic.

The principal tribes represented in the collection are the Toba, Lengua, Chamacoco, Guarani, Cuximoso, Pana, Paita, and Omiri. The collection is especially interesting as representing tribes which have had but little contact with civilization.

The collection contains much beautiful feather work.

CASES 1, 2, 3, 4, 5, 6, 7, AND 8.—Tribes of the Gran Chaco region.

CASES 9, 10 AND 11.—Tribes of Venezuela.

CASES 12, 13 AND 14.—Tribes of British Guiana.

### HALL 33.

### CERAMICS.

The introduction of the most primitive of ceramic arts in any part of the globe is regarded as a first step in the beginning of civilization, and many objects made by the ancient peoples are to be found in the halls devoted to archeology. While the fabrication of Chinese and Japanese porcelain has been carried on for centuries, the manufacture in Europe began only about two hundred years ago. There the masters of the art for years enjoyed the patronage of the kings and princes.

Upwards of seventy-five years ago the first hand porcelains made in America came from the Tucker works near Philadelphia, but the industry languished after 1838. Several pieces of fine "Tucker" ware are in the collection.

The development of the art in America in late years is most encouraging.

CASE 1.—Porcelain plate. Arita ware; diameter 24 inches; depth at center  $2\frac{5}{8}$  inches; decorated in imitation of the work of Kakiyemon, the distinguished Hizen potter.

Porcelain statue of Bellman, the greatest lyrical poet of Sweden.

Porcelain statue of Gustavus III.

Porcelain plate, hand-painted by Thorne, Stockholm, Sweden.

Porcelain plate, blue and gold border, Stockholm, Sweden.

Porcelain plate, chrysanthemums and fighting cocks; imitation of Japanese.

A decorated earthen jar, Jamaica.

CASE 2.—Porcelain vase, decorated in birds of bright plumage; made by pupils of School of Technology, Tokio, Japan, for exhibition at Chicago. Cloisonne picture, without wire, of Fuji-yama.

An exceedingly fine old Satsuma tray, representing a festival scene.

Four transparencies made at Phoenixville, Pa., between 1867 and 1870. Exceedingly rare and unique.

White undecorated ware, pitcher of Doulton stoneware, Rockingham jars, and representative types of Early American potteries.

CASE 11.—Contains ten examples of the beautiful Rookwood ware of recent make, and two of an earlier make.

CASE 12.—Various clays used in the manufacture of pottery, moulds, stilts, saggers, finished and unfinished and trial pieces from the Ohio Valley Pottery, Wheeling, W. Virginia, now suspended.

CASE 13.—Glass-ware manufactured by the Venice and Murano Manufacturing Co., at their exhibit, Midway Plaisance, Chicago Day, October 9, 1893; replicas of famous pieces.

CASE 14.—Tea set of porcelain covered with gold by "Chryso-Ceramic" process executed by Miss Healy, Washington, D. C.

Vase, exact copy of the Royal Meissen, (A German vase) with landscape in Jemtland, by Thorne.

Porcelain vase, Greek design, ornamented with gold, a copy of Macribey, similar to the Limoges ware.

Porcelain from the Worcester Royal Porcelain Company.

Porcelain compotier and candelabra made by the St. Mary's Porcelain Works, Langton, Staffordshire, England.

CASE 15.—Glass-ware manufactured in Ehrenfeld, Prussia.

CASE 18.—A large porcelain center-piece of Limoges ware for dining-table; remarkable for success achieved in delicate coloring at high temperature. It is one of the most important pieces of hard porcelain ever made, and in the making of it difficulties have been overcome that only a manufacturer can appreciate.

NOS. 19 AND 20.—Two large and handsome Kutani (Japan) vases of purple and blue, hydrangea design.



This ware is much prized in Japan on account of its fine enamel colors and elaborate ornamentation.

No. 21.—Vase of Ault faience.

NO. 22.—Jardiniere and pedestal of Ault faience.

No. 23.—Large vase of modern ((trade) satsuma.

No. 24.—Jardiniere and pedestal of Ault faience.

No. 25.—Large Vase of Ault faience.

NO. 26.—Jardiniere and pedestal of Ault faience.

NOS. 27 AND 28.—Two large handsome royal blue Berlin porcelain vases, decorated with medallions, cupids and portraits of golden vines and raised flowers.

## ALCOVE 104.

### PHYSICAL ANTHROPOLOGY.

This section is situated on the east and south galleries of the East Court. On the east gallery is the Anthropometric Laboratory, in which are placed the various physical apparatus.

There are in the same room, apparatus for illustrating the law governing the distribution of individuals in a binominal curve, and for the drawing of the outlines of the various parts of the skeleton.

In addition there are apparatus for taking the measurements of the body. Among the instruments here used are an adjustable table for measuring the stature, and a chair constructed on a similar principal to study the variations in the length of the trunk, at different angles of incline to the perpendicular.

On the south gallery are situated cases containing the collections of crania, skeletons, etc.

CASE 1.—Cranimetrical nomenclature.

CASE 2.—Sexual variation in the skeleton.

CASE 3.—Skulls showing the range of variation in the sutures.

CASE 4.—Skulls showing the range of variation at the glabella and pterion, and in the orbits.

CASE 5.—Skulls showing variation in the nasal skeleton and in the degrees of prognathism.

CASE 6.—Skulls showing variations in the intermaxillary suture, mastoid process, shape of palate and direction of palatine suture, and at the region of union.

CASE 7.—Skulls showing variations in the lower jaw, lachrymal bone and occipital condyles.

CASE 8.—Clavicles and scapulae selected to show range of variation.

CASE 9.—Skulls showing the range of variation in dentition.

CASE 10.—Sacri, sternebrae, and ossa innominata selected to show range of variation.

CASE 11.—Humeri and tibiae selected to show the range of variation.

CASE 12.—Skulls showing range of variation in capacity, the cephalic and altitudinal index.

CASE 13.—Skulls showing the range of variation in the orbital, nasal and dental indices.

CASE 14.—Skulls showing the range of variation in the facial, palatal and bizygostephanic indices.

CASE 15.—The range of variation in the scapular, lumbar, sacral and pelvic indices.

CASE 16.—The range of variation in the femur.

CASE 17.—Skulls affected by disease.

CASE 18.—Skulls artificially deformed.

CASE 19.—Trepanned skulls from Peru.

CASES 20, 21, 22, 23, 24 AND 25.—Disarticulated skeletons showing a wide range of pathological or anomalous characters.

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### ALCOVES OF THE EAST COURT.

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ALCOVE 81.—Reproductions of Central American Antiquities.

ALCOVE 82.—Case 1. Prehistoric Pottery of Colombia.

CASE 2.—Stone carvings from Valley of Mexico.

CASE 3.—Carved stone figures. Mexico and Central America.

CASE 4.—(Temporary.) Archeology of Ohio.

ALCOVE 83.—Cases 1, 2, 3, 4 and 5.—Objects from the Hopewell group of Mounds, Ohio.

ALCOVE 84.—CASE 1.—Archeology of Costa Rica.

CASES 2 AND 3.—Temporary installation of Ethnological material of the Cheyenne Indians.

CASE 4.—Archeology of Nicaragua.

ALCOVE 85.—CASES 1, 2 AND 3.—Prehistoric Pottery from Arkansas.

CASE 4.—Archeology of Alabama, Florida, and Arkansas.

ALCOVE 86.—CASES 1 AND 2.—Archeology of California.

CASES 3 AND 4.—Pottery, woven articles, etc., from Cliff Dwellers.

ALCOVE 87.—Models of Cliff Dwellings.

ALCOVE 89.—CASES 1, 2, 3, AND 4.—Prehistoric pottery, objects of stone, wood, and metal from Cuzco, Peru.

ALCOVE 90.—CASES 1, 2 AND 3.—Prehistoric pottery, objects of stone, wood, etc., from Santa Valley and Northern Peru.

CASE 4.—Archeology of Iquique, Chile.

ALCOVE 91.—CASES 1, 2, 3 AND 4.—Prehistoric pottery and contents of graves from Sierra Gorda, Ancon, and Cerro Azul, Peru.

ALCOVE 92.—CASES 1, 2, 3, 4 and 5.—Contents of graves, mummies, Ancon, Peru.

ALCOVE 93.—CASES 1, 2 AND 4.—Prehistoric pottery from Colombia.

CASE 3.—Archeology of La Plata Island, Ecuador.

ALCOVE 94.—Reproductions of Central America.

#### ALCOVES OF THE WEST COURT.

ALCOVE 107.—CASES 1 AND 2.—Pawnee Indians, Oklahoma. Temporarily installed.

ALCOVE 108.—CASES 1, 2, 3, 4.—Pawnee Indians, Oklahoma. Temporarily installed.

#### ALCOVES OF THE SOUTH COURT.

ALCOVE 109.—CASE 1.—Catawba Indians, South Carolina and Cherokee Indians of North Carolina. Temporarily installed.

CASE 2.—Flathead Indians, Montana. Temporarily installed.

ALCOVE 110.—CASE 1.—Yukon Indians, Alaska. Temporarily installed.

CASE 2.—Kiowa Indians, Oklahoma. Temporarily installed.

ALCOVE 111.—CASES 1 AND 2.—Wichita Indians, Oklahoma. Temporarily installed.

CASE 3.—Kootenay Indians, Idaho and British Columbia. Temporarily installed.

#### UNDER ALCOVE OF WEST COURT.

ALCOVE 104.—Models of original harvesting machines, etc., donated by the McCormick Harvesting Co. Ancient plows, primitive wind mills.

#### EAST DOME (HALL 58.)

In this hall are installed an interesting series of velocipedes, bicycles and tricycles, arranged in order of development; beginning with the primitive Draisine and ending with types of the bevel-gear'd chainless bicycles.

CASE 1.—The Drasine. This rudimentary bicycle was conceived by Baron von Drais in 1816 and was patented in Paris in that year. It was brought to America in 1819.

CASE 2.—A two wheel velocipede. This specimen is one of five manufactured in 1869.

CASE 3.—A two-wheel velocipede, which is evidently one of the original Lallemant type and represent the third stage of the bicycle era. The second type appeared in 1845.

CASE 4.—Bicycles of the "upright" type, among them being the Columbia which is regarded as the pioneer "upright" bicycle of American construction, and was brought out in 1878, also a "back woods," made by hand. The driving wheel is a carriage wheel, and the rear wheel is solid with a steel tire.

This is claimed to have been the first bicycle in the Ohio Valley.

There are three models of the upright bicycle shown in this case.

CASE 5.—Two safety bicycles one an American star, which type was invented in 1880, and for years was an important factor on the road and track.

The other safety in this case was operated by a noisy ratchet.

CASE 6.—A Columbia two-track tricycle which was introduced in 1885. It was the only practicable machine for ladies until the advent of the drop frame safety.

Two ladies' safety bicycles of the earliest type.

Two men's safety bicycles, one a Featherstone pneumatic tired, which represents the first pneumatic tired bicycle in the United States. The tires with which it is fitted are the original pneumatic, the first pair made in America.

A Columbia with ornamentations consisting of 18 karat gold mountings, in richly chased designs.

CASE 7.—Two league chainless, representing the original bevel-gear construction.

#### ALCOVE 104.

#### AGRICULTURAL MACHINERY.

The material in this collection was contributed by Mr. Cyrus H. McCormick.

Models illustrating the development of moving and reaping machines.

Arabian plows.

Chinese plows, harrows and other agricultural implements.

Sections of a South American windmill.

#### HALLS 37, 38, 39, 40, 55 AND 54, EAST PAVILION.

#### DIVISION OF TRANSPORTATION.

A. Marine Transportation: Halls 37 and 38.

B. Human Burthen-Bearers: Hall 39.

C. Pack Animals: Hall 40.

D. Land Vehicles: Hall 55.

E. Street (or Tram) Cars: Hall 54.

In the Division of Transportation all methods of marine and land conveyance are included, except the steam railway, which may be regarded as the culmination of the several series in-

stalled in the six Halls above enumerated. The exhibits are arranged in the order of development, beginning with the floating log and the human burthen-bearers and pack animals, continuing through methods of utilizing man and animals for traction, sledges and vehicles with wheels, and concluding with the street (or tram) car, which, when hauled by animals, marked the beginning of the present railway system.

The objects in this section, with very few exceptions, were acquired from the Department of Transportation Exhibits, World's Columbian Exposition.

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## HALLS 37 AND 38.

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### MARINE TRANSPORTATION.

In these halls are installed an interesting series of original boats and models illustrating various methods of marine conveyance, floating with the tide, towing by man and beast, propulsion by pole, oar and sail, including models of the steamboat, steamer, towing rafts of logs and coal barges; also many relics of old-time whaling vessels.

In the center of Hall 38 stands an experimental Flying Machine, built by Lawrence Hargraves, of Stanwell Park, Clifton (near Sydney), New South Wales.

NO. 1.—Models illustrating the progress of improvement in primitive craft, beginning with the chatti, or fisherman floating upon an earthen jar, and including various boats propelled by poles or oars. Other important objects are the Cingalese catamarans and outrigger canoes; the poorinda, a barge of state from Kashmir, India; an imperial caique, the state barge of the Sultan of Turkey; the Mohr punkee, or peacock boat, of the Ganges, used by the Rajahs and wealthier Hindoos as a pleasure boat; a barge from Burmah; state barge of the Governor of Kashmir, India; and finally the state barge of the Boa or Emperor of Burmah.

NO. 2.—Padda (model) Colombo, Ceylon.

NO. 3.—Models of oriental boats propelled by sails, beginning with the log raft, equipped with primitive sail; followed by the heavily laden Hindoo trading vessels moving by wind, and concluding with the great freight junk of the China coast

—the highest development of the Asiatic sailing vessel. Interesting objects in this case are East Indian cargo boats with loads, illustrating the Hindoo methods of combined sailing, rowing and towing against the current; the loungo and louzgat, Burmese freight boats for transporting produce; the likin, or Chinese revenue cutter, and an extensive series of junks that ply along the China Coast.

NO. 4.—(Upper boat.) Yattrava or Dhoney of Colombo, Ceylon. A decked vessel with outrigger and lug sails; usually manned by a crew of six men. Model about one-thirtieth full size.

(Lower boat.) Orua from Ceylon. Fishing boat with outrigger and lug sail. Model one-eighth of full size.

NO. 5.—Catamaran, or raft (original), from Colombo, Ceylon. This was formerly used for transporting the royal mails from Colombo, coastwise, about the island.

NO. 6.—Balsa (original), boat made of rushes, Lake Titicaca, Peru; for one person only.

NO. 7.—Bimba (original), a catamaran, or raft with sides. St. Paul de Loanda, Angola, Africa.

NO. 8.—Balsa (original), boat made of rushes, Lake Titicaca, Peru. Owing to its light draught large cargoes are often carried.

NO. 9.—Cabilletto (original), fishing boat, made of rushes, Huanchaca, Peru. Used in fishing, especially in heavy surf. The occupant kneels just abaft amidships of this boat and propels it by means of a short broad-bladed paddle.

NO. 10.—Donga (original), from Benguela, Africa. A very primitive dugout. The addition of the strip along the gunwale is one of the earliest efforts to increase height of sides of the boat.

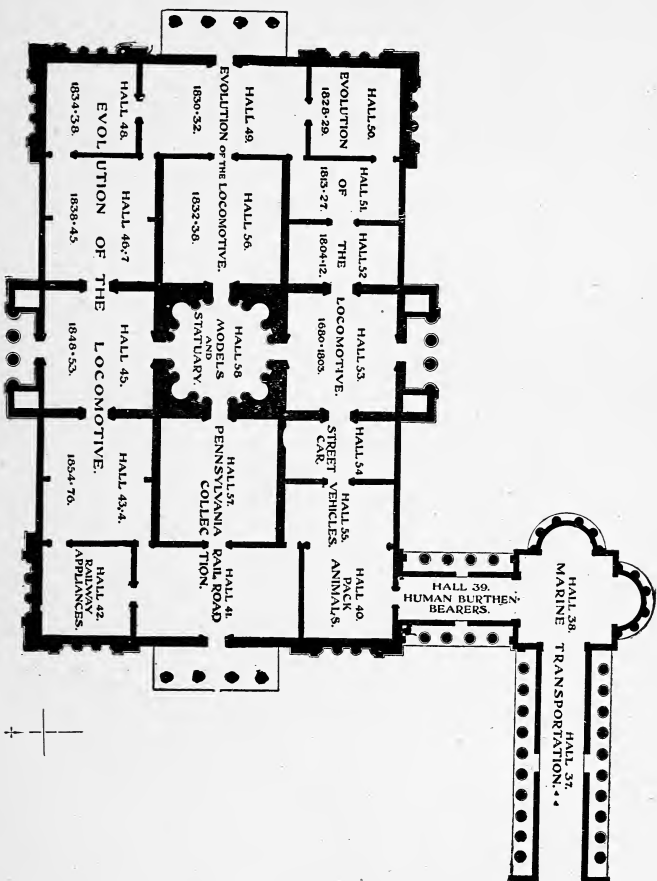
NO. 11.—Dugout (original), for carrying two persons, Colon, Colombia, South America.

NO. 12.—Dugout (original), from the headwaters of Rio Ozama, San Domingo. Made by Indians, but showing European influences both in exterior and interior form.

NO. 13.—Dugout (original), from Seneca Indian Reservation, New York.

NO. 14.—Corial (original), made by the Accawoi Indians, headwaters of the Demerara river, British Guiana, South Amer-





PLAN OF DIVISION OF TRANSPORTATION.

ica. This is the highest type of dugout canoe made by savages of any country, and is not patterned after the craft of any civilized race.

NO. 15.—Tlo (original), a dugout for fishing purposes, made by the Bella Coola Indians, near Fort Wrangel, Alaska.

NO. 16.—Dugout, with sail (original). Colon, Colombia, South America.

NO. 17.—Surf canoe (original), with outrigger, Apia, Samoa. Used for general transportation and fishing where surf is heavy.

NO. 18.—Woodskin (original), made by Accawoi Indians on headwaters of Rio Essequibo, British Guiana, South America, the most primitive form of bark canoe.

NO. 19.—Birchbark (original), upper Yukon River, Alaska. The highest type of bark canoe made by savages is made by the Indians of North America.

NO. 20.—Kyak (original), a decked skin boat used by Eskimo of America, Asia and Europe in hunting and fishing. Port Clarence, Alaska.

NO. 21.—Caique (original), or row-boat; Constantinople, Turkey. A pleasure boat.

NO. 22.—(Stand.) Model of fishing boat of the type used on the Sea of Galilee in the time of Christ. The model was made in Syria.

NO. 23.—Model of punt, or scow, used for ferrying and general transportation purposes in the harbor of Curacao, Dutch West Indies.

NO. 24.—(Stand.) Model of fishing boat used near Curacao, Dutch West Indies.

NO. 25.—Venetian gondola for private use.

NO. 26.—Daighsa (original). Locally called "Bumboat" by English sailors. Daighsas are used generally by Jewish merchants who peddle produce and fruits around Maltese harbors. Hence the inscription upon the seatback in the stern-sheets: "Heartily, wishing, all, sort, of, wealth, to, mankind, and, that, I, may, have, chance, to, live, honestly, with, same." Valetta, Malta.

NO. 27.—Bragazza (original). A caravel-built, two-masted fishing vessel of Venice, Italy. The sails are artistically painted,

showing the survival of ancient Phœnician art influences among the Adriatic fishermen. On the foresail the inscription runs: "Peace to Thee, St. Mark, my Evangelist."

ON THE NORTH AND SOUTH WALLS are hung pictures from the West Coast of South Africa, Asia, and the United States—illustrating many primitive and other craft, including types of the highest development of wooden-bottomed American sailing vessels. In bas-relief are shown hulls of whaling vessels, also lithographs of whaling vessels surrounded by icebergs in the Arctic seas.

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### HALL 38.

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CASE 1.—Models of steam tow boats with large tow of coal from Pittsburg to New Orleans. Secured through the Department of Mines and Mining, World's Columbian Exposition. The steamer represented is 200 feet long, 42 feet wide, with cylinder 24 inches in diameter and 12 foot stroke of piston, and has seven boilers. The barges are each 130 feet long, 25 feet wide and  $7\frac{1}{2}$  feet deep, each carrying almost 13,000 bushels of coal. The steamer and tow, when running, occupy a space of 700 feet long and 150 feet wide.

Model of a raft of logs in the Mississippi River, being towed by the stern-wheel steamboat "Juniata." The steamer is hitched to the raft bow on and by means of guy-ropes run to the nearest corners of the tow, the steamboat is made to direct the course of the raft. The model of the steamboat of metal. The model of the raft is made of white pine branches cut in Northern Wisconsin. Both boat and raft are constructed on  $\frac{1}{4}$ -inc scale.

CASE 2.—Models of river rafts and boats. The Jolly Boat—ferry boat of the Ganges. The Donga fishing and hunting boats. River trading boats from Malay Peninsula and China.

CASE 3.—Ship barometer, log books, charts, chronometer, compasses and quadrants from old whaling vessels.

CASE 4.—Wooden model of the "Santa Maria." A piece of wood from each exposition building (except concession stands) erected before May 1, 1893, in Jackson Park, is incorporated in this model, which is made to an exact scale.

NO. 5.—Standard containing drawings, lithographs and prints of marine engines and experimental naval appliances. A letter to First Consul Napoleon of France from Robert Fulton, pertaining to plunging boats or masked batteries for use in the destruction of vessels in naval warfare, is shown here.

NO. 6.—Statue of Robert Fulton.

NO. 7.—Statue of John Ericsson.

NO. 8.—Statue of Denis Papin.

NO. 9.—Statue of man at the wheel, typical of marine transportation.

CASE 10.—Experimental flying machine driven by compressed air. The machine was built by Lawrence Hargrave, of Stanwell Park, New South Wales, who has built eighteen experimental and successful flying machines, of which this is No. 14. An experimental test was made with this machine on March 31, 1892, and at a pressure of 250 pounds in the main tube, it flew 312 feet in nineteen seconds.

NO. 11.—Models of double and single propellers for vessels; also, hull of tug boat.

ON THE WALLS are hung a series of drawings, photographs and prints of the first propulsion by steam on water. Photographs of river, lake and ocean steamers, including relics of advertising posters in early days, form an interesting part of this exhibit.

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## HALL 39.

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### HUMAN BURTHEN BEARERS.

In the collection of Human Burthen Bearers are found life-size figures and models illustrating the primitive methods of transportation from widely diversified sections of the world, demonstrating the slow progress made in the manner of transporting goods and the wonderful endurance shown by the people of these countries.

CASE 1.—Life-size figure representing street scenes in Constantinople, Turkey; street porters, transporting cases destined for the World's Columbian Exposition. Fire sergeant and original of fire extinguisher, chair carriers, and sedan chair of a wealthy Turkish lady. Water, milk and bread peddlers.

CASE 2.—Life-size figures of burthen bearers from South America. Indian carrying a silla, or traveling chair, in which is seated an American on his way over the mountains to Bogota, the capital of Columbia. Two Indian cargadores, male and female, transporting goods from Guayaquil to Quito, capital of Ecuador.

CASE 3.—Negro woman, life-size, representing the common method of carrying goods on the head in early slavery days in the southern part of the United States, also thirteen models of cargadores, showing the different methods of transportation which prevail in Latin America.

NO. 4.—The palanquin used by Mrs. French-Sheldon as a carriage, a boudoir and a drawing-room during her explorations in eastern Africa.

NO. 5.—Sedan chairs used by ladies of Bogota, Colombia, South America.

NO. 6.—Phillipan, a primitive palanquin from Antananarivo, Madagascar.

NO. 7.—A Maxilla, or palanquin, from St. Paul de Loanda Angola, Africa.

No. 8.—Traveling hammock from Funchal, Island of Madeira.

On the walls are shown photographs and lithographs of burthen bearers and their methods of transportation, from various parts of the world.

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## HALLS 40 AND 55.

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### PACK ANIMALS.

Burthen bearing by animals is illustrated by a full series of pack animals and saddles. The animals equipped for the journey stand on the west side of and in the center of hall, and the saddles in a case opposite. Among the most interesting are the Syrian pack saddles on the camel; the pack saddle with bales, accompanied by Arriero, or mule driver of Bogota; the Lechera, or woman milk peddler, of Ecuador; and the vanquero, or cattle herder, of Colombia, South America.

CASES 1 AND 2.—Show different stages in the development of pack and riding saddles. There are specimens of the

primitive American pack saddle, with esteraltas or plantain saddle pads; the skeleton saddle of the Cheyenne Indian warriors; three very handsome saddles from Latin-America, including one heavily ornamented with solid silver; and Mexican saddles. With these are various Turkish saddles; the beautiful gold embroidered one was formerly used by the Sultan of Turkey. Specimens of Asiatic harness are also shown.

NO. 3.—Mule with pack saddle, from Bolivia, South America, loaded with two bales destined for the World's Columbian Exposition and accompanied by an arriero, or mule driver.

NO. 4.—Lechera or woman milk peddler, Ecuador, South America.

NO. 5.—Vaquero or cattle herder, from Colombia, South America, equipped with twisted rawhide lariat and rope tether, and mounted on a mule.

CASE 6.—Camel with pack saddle, showing method of transporting of merchandise across the deserts of Asia and Africa.

NO. 7.—Donkeys carrying street peddlers, a common scene on the streets of Constantinople, Turkey.

NO. 8.—Donkey with Syrian bridle and pack saddle, from Jerusalem.

NO. 9.—Donkey with baker's pack saddle, from Constantinople, Turkey.

NO. 10.—Burro, with rush saddle from Peru, South America, the most important beast of burthen in all Latin-American countries.

NO. 11.—Burrito (or young burro), from Peru, South America.

NO. 12.—Llama with blinds and panniers transporting portmanteaus over the mountains of Bolivia and Peru, South America.

NO. 13.—Palanquin for passengers, transported by mules. A common mode of conveyance in the Orient.

On the walls are hung specimens of pack saddles, including a series of photographs of animal palanquins from Persia, and pack animals from various parts of the world.

## HALLS 54, 40 AND 55.

## LAND VEHICLES.

In the collection of land vehicles are installed vehicles from widely separated portions of the earth. The most interesting are the sledges of sub-tropical Madeira, where snow never falls; the Scythian racing chariot, interesting in that it differs typically from the Assyrian chariot in the number of spokes; the rolling hogshead, a relic of early colonial days in the south; and the Mexican caretta, a cart with spokeless wheels. These illustrate the introduction of the wheeled vehicles into civilization. The Sicilian pleasure cart is adorned with religious decorations. The Turkish holiday wagon is in use both in European and Asiatic Turkey. The Cuban volante is hitched tandem, the leading horse being almost in front and a little to the left of the shaft horse. Here are also an interesting series of models of bullock carts and other native vehicles from India and Burmah; carts, wagons and carriages from Ceylon; carts and wagons drawn by man; elephant trappings, and vehicles illustrating native land transportation in the Malay Peninsula, Java and Siam. Models of some American carts and horses are also shown.

NO. 14.—Carro de Monte, or mountain sled from Funchal, Island of Madeira, made of willow and mahogany wood and finished in red cloth.

NO. 15.—Carro de Boss, mountain sled with canopy, from Funchal, Island of Madeira, made of mahogany wood. Intended for four persons.

NO. 16.—Corca, or freight sled, drawn by bullocks, from the Island of Madeira. Snow never falls in Madeira, but sleds are used as the steep, hilly streets of Funchal prevent the use of wheeled vehicles. The Carro de Monte, Carro de Boss, and Corca are the ordinary means of transportation in Madeira.

NO. 17.—Replica of ancient Scythian racing chariot. This is an exact copy of the original found in an Egyptian tomb and now in the museum of Archæology at Florence, Italy.

NO. 18.—Sicilian holiday cart harness from Palermo, Island



of Sicily, decorated with antique religious figures; used also in Naples and Southern Italy.

NO. 19.—Red River cart and harnessed ox, the only method of transporting merchandise northwest of St. Paul, Minn., previous to 1871.

NO. 20.—Araba Codja, a country holiday carriage from Constantinople, Turkey, drawn by oxen. Their gaudy harness and hangings and bells make this a most picturesque and interesting specimen. The wagon contains no seats. The passengers sit cross-legged upon cushions placed at each side of the vehicle.

NO. 21.—Norwegian cariole from Norway, originally exhibited at the Centennial Exposition, Philadelphia.

NO. 22.—Volante, a carriage in common use in Cuba, drawn by two horses. A postilion rides the leader, and the passengers drive the shaft horse, using line and bit as customary with single horse vehicles.

ON THE WALLS are photographs, lithographs and paintings illustrating the types of vehicles from all parts of the world. The interesting series of royal vehicles includes royal coaches and sleigh of the King of Bavaria; royal coaches of the sixteenth and seventeenth centuries; coaches of the Lord Mayor of London and Dublin, and of Pope Paul the 5th. Royal coaches from Japan; Russia and Portugal. The Shah of Persia's pleasure carriage, coach and his racing horses; also a series of Latin-American vehicles, including many from India, China and Burmah. A series of ancient Assyrian and Egyptian vehicles, types in use hundreds of years before the Christian era.

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#### HALL 54.

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CASE 1.—Models of vehicles from various parts of the world. Ceylon carts for freighting; Hindoo and Burmese wagons drawn by bullock and horses, including a variety of Turkish wagons, and modern American horse and cart.

NO. 2.—Ghurry cart, drawn by man, from Surat, India, largely used for transporting goods within the cities.

NO. 3.—Rolling hogshead, with yoke of oxen and negro driver, illustrating the method in Virginia in colonial days of

transporting tobacco from the plantation to the markets of Jamestown and Richmond, Virginia.

NO. 4.—Carreta ox-cart wheels without spokes, made by the Indians of the Pueblo of Acoma, New Mexico, with oxen yoked according to the Mexican method.

NO. 5.—Passenger wheelbarrow, Amoy, China, used to transport travelers from point to point within the city. The passenger places one foot across the front cross-bar, allowing the other to swing free, and resting the arm on top of wheel shield.

No. 6.—Represents a section of Clay street, San Francisco, California, in 1872. On this street was placed and operated the first cable railroad in the world. A section of the cable road, including yokes and rails, and the first grip-car run for public use on any cable street railway, are here shown. On the stands are specimens of the original yokes and the first original grip which was made for Mr. A. S. Hallidie, the inventor of the cable railway, 1872. A small model of the grip, together with models of cars are also here. At the end of the stand are two yokes used on the cable railway of Germany.

ON THE WALLS are a series of photographs of land vehicles, also a large drawing of Stephenson's first street car, together with photograph of street car lines in other countries.

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## TRANSPORTATION BY STEAM.

This division of transportation, occupying the East Pavilion, is designed to illustrate, largely through full-sized reproductions and originals, the evolution and development of permanent way, structures, motive power, equipment and appliances. The nucleus of this representation is in the extensive collection made by the Baltimore & Ohio Railroad Company for the Columbian Exposition, and purchased by the Field Columbian Museum. This collection embraces thirty-eight full-sized working reproductions, covering the period from the initial idea of steam propulsion on land, 1680, to the first "Camel" engine of 1848, and nine original locomotives, including examples of the practice followed from 1832 to 1876. In addition there are nearly eighteen hundred uniformly mounted and framed ex-

amples in original wash-drawings, detail plans, photographs, prints, and lithographs, illustrating the evolution and development of the railway in every land where the locomotive whistle has been heard.

The interesting collection made by the Pennsylvania Railroad Company for the Exposition is also in the Museum, and it tells in a graphic and instructive manner the story of the progress of this great railroad corporation by series of models and originals. The Baldwin Locomotive Works contributed the full-sized working reproduction of the "Old Ironsides," the first of the Baldwin engines, and the Rogers Locomotive Works the full-sized working reproduction of the "Sandusky," the first Rogers engine. The Philadelphia & Reading Company contributed the "Rocket," the original No. One on that road; the Illinois Central Company the "Mississippi," the original first locomotive in the Gulf States; the Chicago & Northwestern Company the "Pioneer," the original first locomotive west of Chicago, and the Mount Washington Railway the original engine, the "Peppersauce," the first mountain-climbing locomotive in the world. The World's Exposition, through the Chief of the Department of Transportation, presented to the Museum the "Samson" and the "Albion," the original first and second locomotives in Nova Scotia, together with the original first passenger car in that country and the two original first cars drawn on rails by a locomotive in the world, those from the Merthyr-Tydvil tram road in South Wales.

In each instance the engines—the originals and reproductions—stand upon either the original or an exact counterpart of the track of their period.

It is suggested that visitors inspect the Halls in the order in which they are described, as in this manner evolution and development may be followed chronologically. On each original engine, as well as upon each reproduction, will be found cards affording much historical information.

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### HALL 53.

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NO. 1.—Full size working reproduction of the "Newton," England, 1680; the first idea of propulsion by steam on land in history.

NO. 2.—Full size working reproduction from the measurements and detailed drawings made from the original in the Conservatoire des Arts et Metries, Paris, of the "Cugnot," France, 1769; the first actual propulsion by steam on land in the world.

NO. 3.—Full size working reproduction of the "Murdoch," England, 1784; first propulsion by steam on land in Great Britain.

NO. 4.—Full size working reproduction of the "Read," America, 1790; the first idea of steam propulsion on land on the American continent.

NO. 5.—Full size working reproduction of the "Trevithick," England, 1800; the first effort of the father of the locomotive.

NO. 6.—Full size working reproduction of the "Trevithick," England, 1804; the first locomotive on rails in the world.

NOS. 6A AND B.—In connection with this are two of the first five cars drawn by a locomotive in the world, they having been attached to the "Trevithick" of 1804, on the "Mythyr Tydvil" tram road in South Wales. These are the original cars in their original form, standing upon the original rails, which in turn are upon the original stones laid on the South Wales tram road in 1800.

NO. 7.—Full size working reproduction of the "Trevithick," 1808, the first locomotive on rails in England.

UPON THE WALLS, series of original large wash-drawings, indicative of the early stages of the evolution of the locomotive. Also, series of original drawings by Theodore Cooper, showing the evolution and development of the railroad bridge of the world. Also, series of bromides of scenes on railroads in foreign countries.

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#### HALL 52:

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NO. 8.—Full size working reproduction of the "Evans," America, 1804; the first actual propulsion by steam on land on the American continent, and the first practical propulsion by steam on land in the world.

NO. 9.—Full size working reproduction of the "Blenkensop," England, 1812; the first locomotive for actual commercial purposes in the world, it running on a rack road.

NO. 10.—Full size working reproduction of the "Brunton," England, 1813; the horse-leg locomotive.

NO. 11.—Full size working reproduction of the "Hedley" model, England, 1813, with which the first practical demonstration of the adhesion of smooth wheels to smooth rails was made.

ON THE WALLS, continuation of the Theodore Cooper series of the evolution and development of the railroad bridge; also a continuation of the large wash-drawings showing the evolution of the locomotive. Likewise, a further series of bromides of railroad views in foreign countries.

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#### HALL 51.

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NO. 12.—Full size working reproduction of the "Puffing Billy," England, 1813, built by Hedley immediately after demonstrating the adhesion of smooth wheels, this locomotive being thus constructed. The "Puffing Billy" is from the measurements and drawings made by the authorities of the South Kensington Museum in London, the original engine, the oldest in the world, being preserved in that institution.

NO. 13.—Full size working reproduction of the "Blucher," England, 1814; George Stephenson's first locomotive.

NO. 14.—Full size working reproduction of the "Howard," America, 1828; the first locomotive patented in America.

NO. 15.—Full size working reproduction of the "Seguin," France, 1827-28; the first locomotive in France, and the first locomotive in the world with a multi-tubular boiler.

UPON THE WALLS, concluding series of the Theodore Cooper drawings of the evolution and development of the railroad bridge. Also, series of large wash-drawings showing the evolution of the locomotive steam carriage period, and series of views illustrative of railroad operation in foreign countries.

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**HALL 50.**

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NO. 16.—Full size working reproduction of the "Rocket," England, 1829; George Stephenson's successful locomotive in the Rainhill trial, the first locomotive contest in the world, the reproduction being from the original drawings.

NO. 17.—Full size working reproduction of Timothy Hackworth's "Sans Pareil," England, 1829; the first locomotive constructed with steam blast, and also a competitor in the Rainhill trial, the reproduction being from the measurements and detail drawings furnished by the South Kensington Museum. The original engine is in that institution.

NO. 18.—Full size working reproduction of Ericsson's "Novelty," England, 1829; the first tank locomotive, and also a competitor in the Rainhill trial.

These three reproductions stand upon the stones, rails and chairs of the original track upon which the trial took place.

NO. 19.—Full size working reproduction of the "Stourbridge Lion," England, 1829; the first locomotive seen in America, having been imported the year named.

NO. 20.—Full size working reproduction of Peter Cooper's "Tom Thumb," America, 1829-30; the first locomotive built on the American continent.

NO. 21.—Statue of George Stephenson.

UPON THE WALLS.—Continuation of the wash-drawings, showing the evolution of the locomotive of the world. Also continuation of the series of bromides, illustrating scenes on railroads in foreign countries, and a series of photographs showing modern bridges and railway appliances.

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**HALL 49.**

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NO. 21.—Full size working reproduction of the "Best Friend," America, 1830; the first locomotive built on the American continent for actual service.

NO. 22.—Full size working reproduction of the "Mercury," England, 1830; George Stephenson's highest type of development, and the father of the standard English engine.

NO. 23.—Full size working reproduction of the original "York," America, 1831; Phineas Davis' first locomotive.

NO. 24.—Full size working reproduction of the "Johnson," America, 1831; the first locomotive with a double firebox.

NO. 25.—Full size working reproduction of the "James," America, 1831; the first suggestion of the link motion.

NO. 26.—Full size working reproduction of the "Costell," America, 1831; first locomotive with oscillating cylinders.

NO. 27.—Full size working reproduction of the "Child," America; 1831; first rotary locomotive.

The five locomotives last mentioned were competitors in the Baltimore & Ohio locomotive competition or trial in 1831, the first event of this character on the American continent. The "York" was the winner.

NO. 28.—Full size working reproduction of the "James," America, 1832; the first locomotive in the world with link motion.

NO. 29.—Full size working reproduction of the remodeled "York," America, 1831; the first of the distinctively "Grass-hopper" type.

NO. 30.—Full size working reproduction of the "Old Ironsides," America, 1832; the first Baldwin locomotive.

ON THE WALLS, photographs on canvas of Harper's Ferry, Buckhorn Wall, and Fairport; these photographic results being eight feet high and sixteen feet long. On the East, North and West walls of this room are a series of original drawings, lithographs, and photographs, illustrative of the development of the Baldwin locomotive from 1832 to 1893. On the walls in the southern half of the room are a series of original drawings, lithographs and photographs, illustrating the progress as manufacturers of the Portland Locomotive Works, the New Jersey Locomotive Works and the Cooke Locomotive Works. Also series of maps showing the railroad occupation of the United States by decades from 1830 to 1890.

#### **HALL 56.**

NO. 32.—Full size working reproduction of the "South Carolina," America, 1832; the first double end locomotive in the world.



NO. 33.—The "Atlantic," America, 1832; original engine, and the oldest locomotive in its original form on the American continent.

NO. 34.—Full size working reproduction of the "Experiment," America, 1832; the first locomotive constructed in the world with the forward or "bogie" truck.

NO. 35.—The "Traveller," America, 1833; original locomotive, and the first in the United States built expressly for freight purposes. This engine has a record of sixty years of active service, a locomotive record without a parallel in history.

NO. 36.—Full size working reproduction of the "Hercules," America, 1837; the first locomotive in the world with equalizing frame and levers.

NO. 37.—The "Thomas Jefferson," America, 1836; an original locomotive of the "Grasshopper" type, the first with cab for engineer and fireman, and the first Winans engine.

NO. 38.—The "Mazeppa," America, 1837; original locomotive, and the first of the "Crab" type.

NO. 39.—Full size working reproduction of the "Campbell," America, 1836; the first or father of the American type of eight wheel passenger locomotive.

NO. 40.—Full size working reproduction of the "La Fayette," America, 1837; the type of the first Norris locomotive with adhesion sufficient to surmount heavy grades.

ON THE WALLS.—Photographs of the cities of Pittsburgh and Washington. A series of original wash-drawings, showing the development of the locomotives of the world and a series of bromides from direct photographs of English historical locomotives. Another series of drawings showing the evolution of locomotives and cars of the elevated railways. Also, a series of detail drawings of American and foreign locomotives.

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#### HALL 48.

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NO. 41.—Original locomotive, "Mississippi," built in England in 1834, imported to America in 1836, and the first locomotive in New Orleans, is standing upon a section of the original track.

NO. 42.—Full size working reproduction of the "Sandusky," America, 1836; Rogers' first locomotive, and the first locomotive west of the Ohio River.

NO. 43.—Original locomotive "Rocket," England, 1838; built by Braithwaite, London, and the first locomotive on the Philadelphia & Reading Railroad. Old "Number One."

UPON THE WALLS.—Original drawings, specifications, lithographs, and photographs, showing the development of the Rogers locomotive; also a series of large wash-drawings, showing the development of the locomotive of the world. Also, series of photographs of railway appliances.

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### DOUBLE HALL 46 AND 47.

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NO. 44.—Original engine "Samson," England, 1838; built by Timothy Hackworth, and the first locomotive in Nova Scotia.

NO. 45.—Original engine "Albion," England, 1839; built by Hackworth, and the second locomotive in Nova Scotia.

NO. 46.—Original passenger car, England, 1831; sent with the "Samson" to Nova Scotia, the year named, and probably the oldest coach in its original form in existence.

NO. 47.—Full size working reproduction of the "Buffalo," America, 1844; first locomotive in the world with 8 wheels coupled.

NO. 48.—Full size working reproduction of the "Mount Clare," America, 1844; the first locomotive built the Baltimore & Ohio Railroad at its own shops, and the heaviest locomotive of its time.

NO. 49.—Full size working reproduction of the "Camel," America, 1848; the first of the heavy freight locomotives in America.

NO. 49½.—Collection of railroad wood cross-ties, from all parts of the world, includes such wood as mahogany, iron bark, yellow wood, and red wood, some of which have been in service twenty-seven years, and are still serviceable.

UPON THE WALL, large wash-drawings, showing the development of the locomotives of the world. Also, series of bromides of railroad scenes in remote countries. Also, series illustrating the development of railroad appliances. Another

series of wash-drawings, showing the development of permanent way. Also, relief map of the United States, showing the rail-railroad lines and principal transportation lines of the sea coast and great lakes.

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#### HALL 45.

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NO. 50.—Original locomotive "Dragon," America, 1848; the first with rocking grate and the oldest Baldwin engine now existing.

NO. 51.—Original locomotive "Pioneer," America, 1848; the first in Chicago.

NO. 52.—Original locomotive "Mason," America, 1860; one of the earliest of the distinctive American model passenger engines.

NO. 58.—Statue of James Watt.

NO. 59.—Iron picture stand, containing photographs of railway car and appliances, by German manufacturers.

UPON THE WALLS.—The Westinghouse series of large original drawings, showing the evolution and development of the railway brake of the world. Another series shows the development of the Pullman sleeping car, and the Wagner sleeping car.

Series of original wash-drawings illustrating the evolution and development of permanent way, and photographs showing interior and exterior views of the royal trains of the world.

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#### HALLS 43 AND 44

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NO. 53.—Original ten-wheel "Camel," locomotive, America, 1852; the first of this type of heavy engines.

NO. 54.—Original locomotive, "Perkins," America, 1862; the first of the special type for climbing the heavy grade of the Allegheny Mountains.

NO. 55.—Original locomotive No. "600," America, 1876; the first passenger mogul. This engine took an award at the Centennial Exposition, Philadelphia.

NO. 60.—Original first chilled steel locomotive tires made in the world.

NO. 61.—Collection of modern railway appliances and permanent way from different parts of Europe and America.

ON THE WALLS.—Series of large original wash-drawings, showing the modern compound locomotives of the world. Series of original drawings and lithographs of historical engines, cars and appliances. Series illustrating development of the leading foreign manufactures of locomotives, cars and appliances. Series furnished by the German government, indicating the development of German motive power and equipment. The "West" series complete, consisting of fourteen plates, showing, in detail, the evolution and development of the English locomotive.

## HALL 42.

NO. 56.—Original locomotive "Peppersauce," America, 1864; the first mountain-climbing locomotive in the world, standing on a section of the original track.

NO. 57.—The original first iron railroad bridge ever erected on the American continent, it being substituted in 1839 for the wooden trestle-work on a crossing near Laurel, on the Baltimore & Ohio line between Baltimore and Washington.

NO. 63.—On platform. Collection of modern railway appliances, permanent way, from Europe and America.

NO. 94.—On shelves. Original cast iron tram rails, from Merthyr-Tydvil Tram Road, Wales, 1800. Cast iron edge rails, with frog, England, 1810. Loughborough edge rails, England, 1820. Old English plate rails, 1822. Original rails and chairs of Liverpool & Manchester Railway, England, on which the first locomotive competition in the world took place, 1829.

ON THE WALLS.—Series of large, original wash-drawings, showing modern compound locomotives of the world. Series of original drawings, showing the development of American railway passenger and freight cars, by the Harlan & Hollingsworth Co. Series of photographs of drawing-room, sleeping and dining cars. Series of photographs and lithographs throughout the world.

### HALL 41.

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CASES 1, 2 AND 3.—Containing samples of material tested by department of chemical and physical tests of the Pennsylvania Railroad Company.

CASE 4.—Relics of early railroad days—lanterns, head-lights, pieces of track, etc., etc.

CASE 5.—Models showing early train signal and early block signals, together with rails, section of track system, switches, and frogs.

NO. 6.—The original Saxby and Farmer interlocking switch. This is the earliest successful switch ever used in America.

STAND 6A.—Relics of early rail joints, car springs, etc., etc.

STAND 6B.—Relics of early track appliances, etc., etc.

NO. 7.—Original Camden & Amboy car, 1836, standing on the original block stone and the original rail of that period.

NO. 8.—An original section of the early wooden stringer and strap-rail construction, together with one of the original driving wheels of the "John Bull" locomotive, 1831, and wooden switch lever, with signal and cross, 1835; also a pair of cast iron wheels on axle, passenger equipment, 1846, and specimens of early railroad track.

NO. 9A.—Section of original "T" rail track, laid on original stone block and ties, Old Portage Railway.

NOS. 9B AND 9C.—Two pair Camden & Amboy wooden passenger car wheels, 1848.

NO. 9D.—Freight car wheel, with split-hub keyed to the axle. On the east side of the car are old rails, etc. On the west side are models of early railroad appliances.

NO. 9E.—Collections of small sections of original rails from Amboy Div. Pennsylvania R. R. showing the development of the rail from 1831 to 1893.

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### HALL 57.

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CASE 1.—Models of the original "John Bull" and train, 1831. Model of the locomotive "John Stevens," 1825. Model

of the locomotive "George Washington," the first locomotive to climb a heavy grade, built by Wm. Norris & Co., 1838. Model of the locomotive "Herald," the first on the Baltimore & Susquehanna Railroad, 1831. Model of the locomotive "Lancaster" and train, built by Baldwin, 1834. Model of passenger car "Victory," 1834. Model of ambulance car used during the war, 1862. Models of passenger and baggage cars Camden & Amboy Railroad, 1850. Model of car on Portage Railroad, 1835. Model of old car used between Rahway and Newark, 1833. Model of passenger car on Portage Railroad, 1834. Series of models showing the sectional canal boats transported on railroad trucks, 1839-1850. Model of machinery of Plane No. 7, Old Portage Railroad, 1835. Model of "Conestoga" wagon. Model of old stage coach, 1825.

CASE 2.—Early publications and documents. Models of cars on J., M. & I. Road. Models showing modern freight cars for coal. Model of Madison plane, and rack-rail locomotive used on it 1850. Models showing modern rail, steam lighters, methods of unloading iron ore from vessels to rail, etc., etc. Statistical model showing the Pennsylvania Railroad system. Original of largest check ever drawn in an American railroad transaction.

CASE 3.—Model showing the transfer of entire freight trains, New York Harbor.

CASE 4.—Large model of the ferry-boat "Washington," running between Jersey City and New York.

NO. 5.—Large model showing the rail crossings of the Alleghenies in the territory on which was located the Old Portage Road of 1832-1852, the New Portage Road of 1853, and the modern system of 1892.

CASE 6.—Model of standard safety underground tunnel for passengers.

CASE 7.—Relief map of Philadelphia terminals.

CASE 8.—Relief map of Jersey City terminals.

NO. 9.—Model of monument erected at Bordentown to commemorate first movement of steam in New Jersey.

CASE 10.—Large globe model showing traffic of the Pennsylvania Railroad system.

NO. 11.—Statue of J. Edgar Thompson, former president of the Pennsylvania Railroad.

NOS. 12, 13, 14, 15, 16.—Standards holding frames containing photographs of locomotives of the different types used on the Pennsylvania Railroad from its inception; also a series of maps showing the development of the Pennsylvania Railroad by decades. A series of views of the disastrous floods at Johnstown, Pa., and the great riot at Pittsburg, Pa., 1877, including a series of views covering the whole line of the Pennsylvania Railroad system. On the west walls, models of seals of corporations and chart of Washington. A series of original wash-drawings, showing the development of the locomotives of the world and a series of promides from direct photographs of English historical locomotives. Another series of drawings showing the evolution of locomotives and cars of the elevated railways. Also, a series of detail drawings of American and foreign locomotives.

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## LIBRARY DEPARTMENT.

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### HALLS 28, 29 AND 34.

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The Library Department comprises the Library (Hall 29) and the Reading Room (Hall 28). The Library is designed for reference purposes only. It contains many valuable scientific and technical works which may be consulted by the general public. It is primarily for Curators and for those desiring to pursue special study or investigation on subjects treated in the Museum.

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### HALLS 28 AND 29.

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### LIBRARY AND READING ROOM.

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The collection of books and pamphlets on the shelves number approximately 30,000. It includes:

The Kunz collection of works on minerals, gems and semi-



precious stones, and containing many rare tomes on these subjects, in Latin, dating back to the 15th and 16 centuries.

The Skiff collection, containing many valuable books of reference on minerals, mining and metallurgy. (This collection has been placed in the Departmental Library of the Department of Geology, West Annex.)

The collection of Russian works on forestry, presented by the Imperial Russian Commission to the World's Columbian Exposition.

The special library of Ornithology donated by Edward E. Ayer contains a set of the original Audubon books and over three hundred rare and valuable reference works. This, together with the proceedings and transactions of the leading ornithological and zoological societies, purchased of C. B. Cory, forms a very complete library on the subject.

Upon the cases are the busts of the eminent scientists and naturalists: Geoffry St. Hilaire, Galileo, Escalapius, Columbus, Cuvier, Agazziz, Humboldt, Huxley, Buffon, Hippocrates, Darwin and Linneus.

Departmental Libraries have been established in all departments of the Museum for working use by the Curators.

The Rules give information as to the privileges of the General Library.

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## RULES OF THE LIBRARY.

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1. The Library is open daily, except Sunday, from 9:00 A. M. to 4:30 P. M. It is entirely a Library of reference.
2. Books are to be used by the public exclusively in the room set apart for that purpose.
3. Curators may have accommodation transfers to their respective Department Libraries.
4. Books may be obtained by making application to the Librarian.
5. Current periodicals can be consulted in the Reading Room, only.
6. Books or periodicals deposited in the Departmental Li-

braries will, in certain cases, upon application, be returned to the General Library for the use of an applicant.

7. Any defacement of books and all losses or injuries must be promptly adjusted to the satisfaction of the Librarian.

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In the Reading Room will be found the current magazines and periodicals pertaining more particularly to scientific, technical and kindred subjects.

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### HALL 34.

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### LECTURE HALL.

This is reserved for all public meetings, lectures, etc., held in the Museum. Courses of popular lectures on travels, expeditions, investigations and on scientific and technical subjects are here given on Saturday afternoons of March and April, and October and November, by curators of the museum and prominent investigators and scientists. The lectures are usually illustrated with stereopticon views.

The semi-circular mural paintings on the sides of the room possess an intrinsic and historical value. The one on the north wall—a scene in Homeric Greece—is by Mr. F. D. Millet; the other illustrates a typical industry, that of pottery, and is by L. K. Earle. These paintings adorned the ceilings of the corner pavilions to the Manufacturers Building, and were contributed by the Exposition to the Museum. On the west wall is a large equestrian picture of General Winfield Scott, while opposite it is one of General John A. Logan—the former loaned by Robert McCurdy, the latter by the Chicago Veteran Club. In the corners of the Hall are placed a heroic bust of Washington, presented by Susse Freres of Paris; a life-size statue of Edwin M. Stanton, Secretary of War in the Lincoln cabinet, and the stooping figure of a fawn—a fragment of a fountain—by R. P. Bringhurst, of St. Louis.

## THE OFFICES OF THE MUSEUM.

THE DIRECTOR—Southeast corner of South Court.

THE DEPARTMENT CURATORS:

ANTHROPOLOGY—Southeast corner of East Court.

PHYSICAL ANTHROPOLOGY—First Gallery of East Court.

BOTANY—Second Gallery of North Court,

GEOLOGY—Southwest corner of West Annex.

ZOOLOGY—Second Gallery of South Court.

ORNITHOLOGY—Southwest corner of West Court.

THE LIBRARIAN—Northwest corner of North Court.

THE RECORDER—Southeast corner of South Court,



